84th YEAR

AMERICAN GAS JOURNAL

OCTOBER 1943

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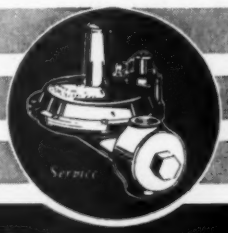
MODERN GAS CONTROLS BY Reynolds



Awaiting the day of Victory, the release of raw materials and man power now used in war production, is a backlog of demand unequalled in our history. This pent-up demand offers a challenge to American Industry.

Post-war buyers will not be satisfied with mediocre goods and uncertain controls. Only new and modern Gas Control equipment will answer the demand.

REYNOLDS is devoting its manufacturing capacity to the war effort but when the day of Victory comes, New Regulators, New Gas Controls will be ready.

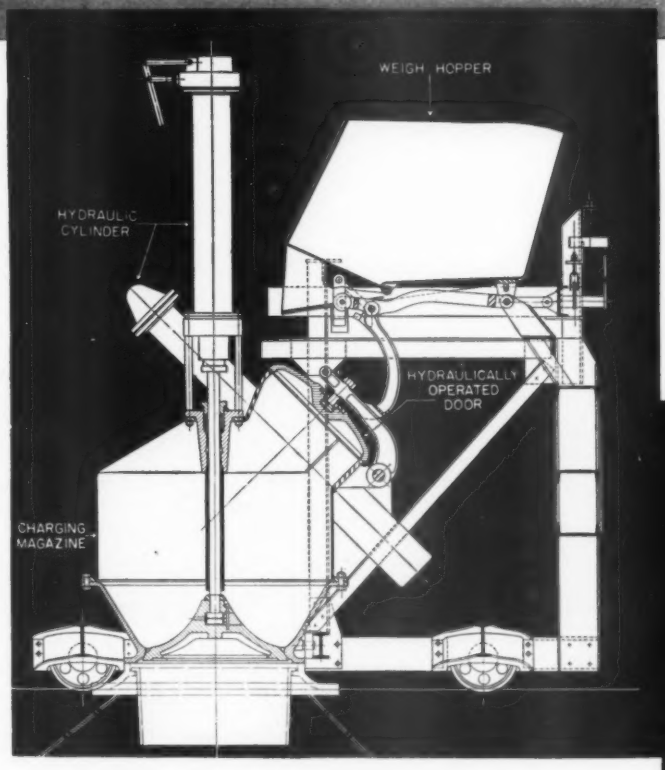
REYNOLDS will be glad to assist you in helping to solve your Gas Control Problems.

REYNOLDS GAS REGULATOR CO. ANDERSON INDIANA U. S. A.

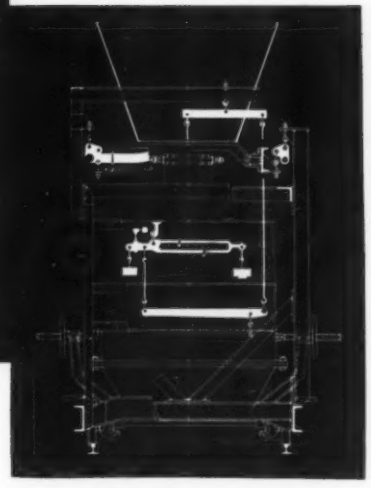
Recognized Gas Control Since 1892

A Tribute
to the
American Gas Association
for its
25 Years of Service
THE American Gas Association was formed on June 6, 1918, through the amalgamation of the American Gas Institute and the National Commercial Gas Association. The A.G.A. thereby became a direct lineal descendant of the first national gas group, the old American Gas Light Association that was originally formed in 1873. In 1927 a greater union was consummated when the Natural Gas Association of America became a part of the A.G.A.
At the organization meeting in 1918 the Secretary reported that 219 gas companies, 6 holding companies, 66 manufacturers and 936 individuals were enrolled as members. Today membership totals 400 gas companies, 350 manufacturers and 4200 individuals.
Of greater significance, we think, than the healthy growth of the Association during this 25 year span, is the remarkable progress made by the gas industry as a whole. Much of the credit can be allocated to the A.G.A. whose guidance and counsel have largely made this expansion possible.
We are proud indeed to serve the great industry that this Association has so effectively furthered. Our membership dates from the Association's inception. The enthusiastic participation by our organization in Association affairs best attests our appreciation of this strong central organization whose guiding hand leads an ever expanding industry.
Pittsburgh Equitable Meter Co.
Merco Nordstrom Valve Co.
We cordially invite
All Gas Men
to meet with their friends
during the A. G. A. Convention
at our Headquarters
Hotel Jefferson
St. Louis, Missouri
BACK THE ATTACK—BUY WAR BONDS

SEMET-SOLVAY *Automatic* CHARGING MACHINE



INCREASES CAPACITY *Saves Labor*



At least ten per cent increase in capacity of your water gas machine can be obtained by the addition of a Semet-Solvay Automatic Charging Machine. Part of the increase is obtained by eliminating shut-downs for charging, part from the added efficiency of a fuel bed of constant depth.

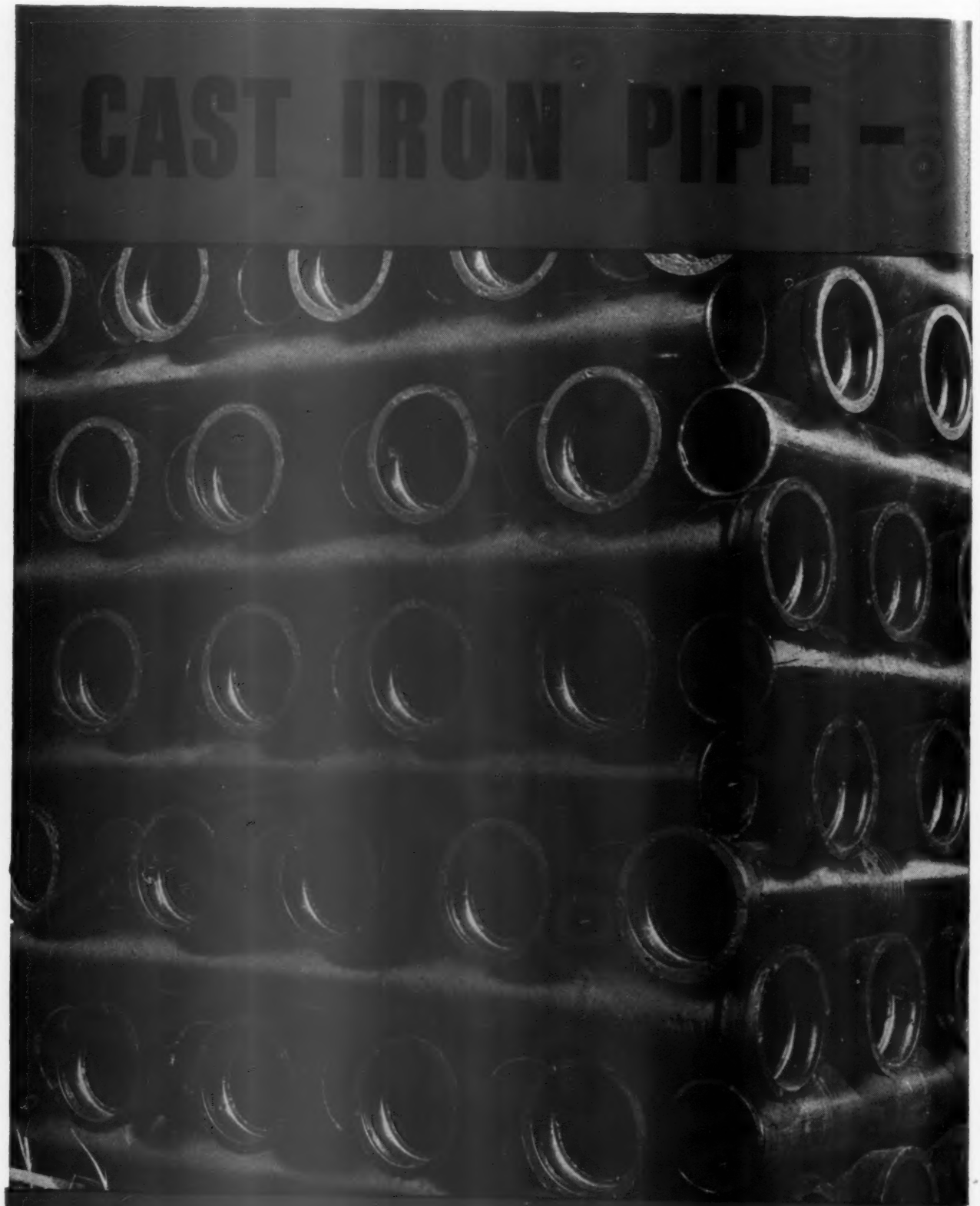
The charger refuels the generator once every cycle during the back-run period. Fuel is accurately weighed by a built-in scale and is uniformly distributed by a hydraulically-controlled spreader. A clamping device gives a gas-tight closure between charger and generator. Seating of the doors is cushioned by the hydraulic cylinders.

The Semet-Solvay Automatic Charging Machine is built for use with any make of water gas or blue gas machine. Automatic charging is not recommended however when the fuel used is bituminous coal. If you operate on coke or anthracite coal, why not write us for further information and a list of satisfied users.

SEMET-SOLVAY ENGINEERING CORPORATION

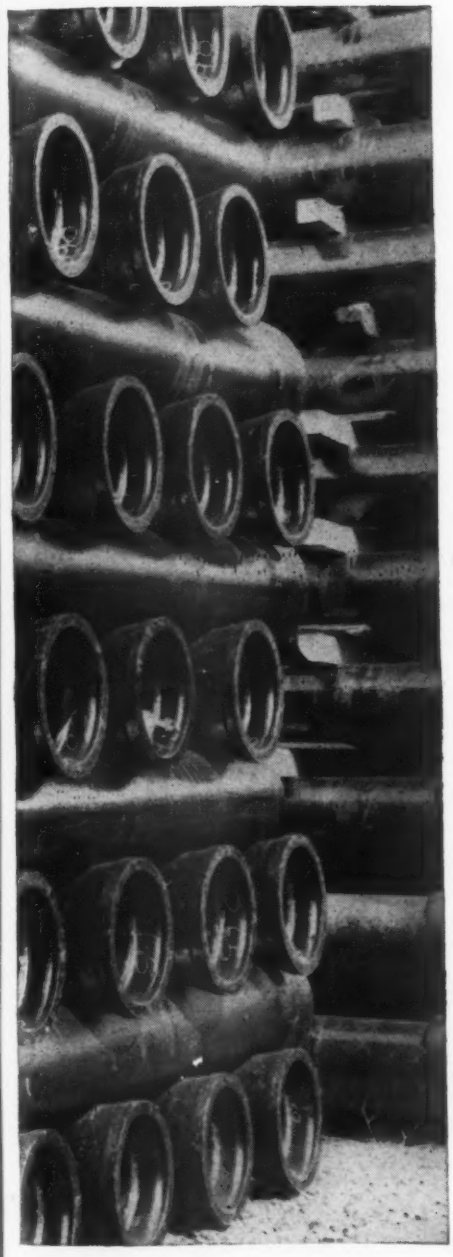
40 Rector Street — New York, N. Y.

AMERICAN GAS JOURNAL, October, 1943. Vol. 159, No. 4. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post-office at East Stroudsburg, Pa., under the Act of March 3, 1879. Printed in U. S. A.



The pipe storage yards at the plants of Cast Iron Pipe Research Association members are amply stocked with cast iron pipe in the most commonly wanted sizes.

ready for SHIPMENT!



For essential maintenance and improvements, you can get cast iron pipe quickly from any of the members of the Cast Iron Pipe Research Association. Plant storage yards are amply stocked with pipe and standard fittings in commonly wanted sizes and types. Special requirements can be quickly produced. Cast iron pressure pipe production facilities have necessarily been maintained intact since Pearl Harbor because of the vast amount of cast iron pipe required for war construction, now largely completed.

Thriftier than ever

You can now get cast iron pipe made in accordance with the new A.S.A. Law of Design. This means pipe scientifically correct as to weights and dimensions for your specific service conditions. This Law of Design is sponsored by official organizations of pipe users and has been approved by the American Standards Association. Cast iron pipe so produced is more economical than ever.

Postwar Planning

One material you can safely specify for prompt delivery after the War is cast iron pipe. And the essence of the need for postwar planning is detailed plans in blueprint form, ready for proposals, so the work can start when the last shell is fired.

CAST IRON PIPE
RESEARCH ASSOCIATION, CHICAGO
CAST IRON
NO. 1 TAX SAVER

ROBERTSHAW BROADCASTS AID FOOD AND FUEL CONSERVATION

COAST-TO-COAST RADIO PROGRAMS FEATURE CORRECT USE OF OVEN HEAT CONTROLS

Women's Interest Programs on Leading Radio Stations Carry Robertshaw Messages

ROBERTSHAW THERMOSTAT

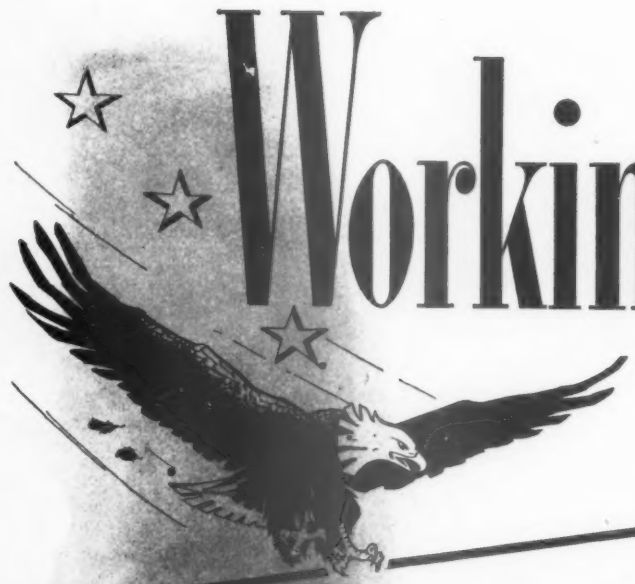
MILLIONS OF HOMEMAKERS LEARNING ADVANTAGES OF ROBERTSHAW OVEN HEAT CONTROLS—SALES ADVANTAGE SEEN WHEN RANGES AGAIN AVAILABLE

TUNE IN THE ROBERTSHAW BROADCASTS OVER THESE STATIONS:

METROPOLITAN MARKET	RADIO STATION	RADIO PROGRAM	BROADCAST SCHEDULE
NEW YORK	WOR	Martha Deane	Mon. thru Fri.
CHICAGO	WGN	June Baker—"Home Management"	Mon. thru Sat.
LOS ANGELES	KNX	Galen Drake—"Housewives' Protective League" Combined with "Sunrise Salute"	Mon. thru Fri. Mon. thru Sat.
PHILADELPHIA	WCAU	Ruth Chilton—"For Women Only"	Mon. thru Fri.
BOSTON AND NEW ENGLAND MARKET	*New England Network* WBZ—Boston, Mass. WCSH—Portland, Me. WTIC—Hartford, Conn. WLBZ—Bangor, Me. WJAR—Providence, R. I. WBZA—Springfield, Mass.	"Marjorie Mills"	Two days per week to alternate with "Yankee Kitchen"
	Yankee Network WNAC—Boston WEAN—Providence WAAB—Worcester WTHT—Hartford WLLH—Lowell—Lawrence WATR—Waterbury WHYN—Holyoke—Springfield WICC—Bridgeport WFEA—Manchester, N. H. WSAR—Fall River WCOU—Lewiston—Auburn, Me.	"Yankee Kitchen"—Ken and Carolyn	Two days per week to alternate with "Marjorie Mills"
DETROIT	WJR	"Mrs. Page's Household Economies"	Mon., Tues., Thurs., Sat.
PITTSBURGH	KDKA	Evelyn Gardiner—"Home Forum"	Mon. thru Fri.
SAN FRANCISCO—OAKLAND	KQW	Galen Drake—"Housewives' Protective League"	Mon. thru Fri.
ST. LOUIS	KMOX	Jane Porter—"The Magic Kitchen"	Mon. thru Sat.
CLEVELAND	WTAM	Jane Weaver—"Woman's Club of the Air"	Mon. thru Fri.
BALTIMORE	WBAL	Mollie Martin	Mon. thru Fri.
MINNEAPOLIS—ST. PAUL	KSTP	Bea Baxter "Household Forum"	Mon. thru Fri.
WASHINGTON, D. C.	WRC	Mary Mason—"Home Forum"	Mon. thru Fri.
BUFFALO—NIAGARA	WBEN	"The Food Magician" (O. P. Stearns)	Mon. thru Fri.
CINCINNATI	WLW	Ruth Lyons—"Consumers' Foundation"	Mon. thru Sat.
INDIANAPOLIS	WIRE	Richard Stone	Mon. thru Sat.
ROCHESTER	WHAM	Hazel Cowles—"Women Only"	Mon. thru Fri.
DENVER	KOA	Lora Price—"Home Forum"	Mon. thru Fri.
SCHENECTADY	WGY	Betty Lennox—"Household Chats"	Mon. thru Fri.
KANSAS CITY	KMBC	Caroline Ellis—"The Happy Home"	Tues., Thurs., Sat.

Through the above outstanding women's interest programs on prominent radio stations, Robertshaw is urging millions of homemakers to demand Robertshaw Oven Heat Controls when new ranges are again available.

COMPANY YOUNGWOOD, PA.



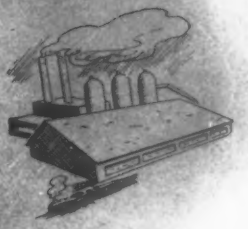
Working to make

. . . on the wartime food front

When war came, Servel quickly retooled. Refrigerators and other home equipment ceased to roll off production lines. Their place was taken by war materials—now pouring from assembly lines in ever increasing quantities. But this is only part of Servel's war effort. With the cooperation of the government, with the help of Gas Companies, Servel developed and is sponsoring three complete food and nutrition programs to help on America's wartime food front.

1 The Home Volunteer Program

Since the early part of 1942, the Servel Home Volunteer Wartime Food and Nutrition Program has been helping American homemakers meet wartime food problems. Through the cooperation of more than 450 Gas Companies, millions of housewives are given sound, helpful advice on shopping, meal planning, and improving nutrition. As new food problems and shortages arose, the program was expanded.



2 The Nutrition in Industry Program

Surveys and medical studies indicate that proper nutrition can increase war workers' efficiency and reduce absenteeism. To bring to war workers the importance of eating the right foods—not only in the home, but on the job—Servel announced, in September, 1942, a comprehensive Nutrition in Industry Program. This action-getting campaign of posters, folders, menus, made available through the cooperation of Gas Companies, is now at work in hundreds of war plants.

3 Fashions in Rations

When food rationing went into effect, housewives everywhere found themselves faced with hundreds of new food problems. And as further help to homemakers, Servel began its radio program—"Fashions in Rations," starring Billie Burke. Every Saturday morning over a coast-to-coast CBS network, homemakers learn worthwhile food lessons from Alice White, Servel's Home Economist. They hear official food communiques direct from Washington . . . reports on new food trends from leading authorities . . . local food news from Gas Companies.

BACK THE ATTACK • WITH WAR BONDS

America Stronger

. . . and after the peace is won

While Servel is working day and night on war production and the wartime nutrition programs, every spare moment is being used to supply the answer to America's most important post-war problem—employment.

When peace returns, American industry must be prepared to give every returning American fighting man a good job. This requires planning—and action. And Servel is putting its post-war plans into action, now.

JOBS FOR RETURNING SOLDIERS

To be able to re-employ every man who left Servel to enter the armed services, to keep veteran employees, to provide jobs for many of the new workers who are helping to fulfill war contract, Servel must be prepared to do two things: First, it must be ready to resume the manufacture of pre-war products. Second, it must have new products to make and sell.

ALL-YEAR GAS AIR CONDITIONING

Servel is fortunate not only in being prepared to manufacture pre-war equipment, but in having the first of its new post-war products perfected and tested—ready to manufacture when war ends. This new product, the Servel All-Year

Gas Air Conditioning unit, fulfills every function of true air conditioning. It cools and dehumidifies in summer, heats in winter, gives year-round circulation and filtering.

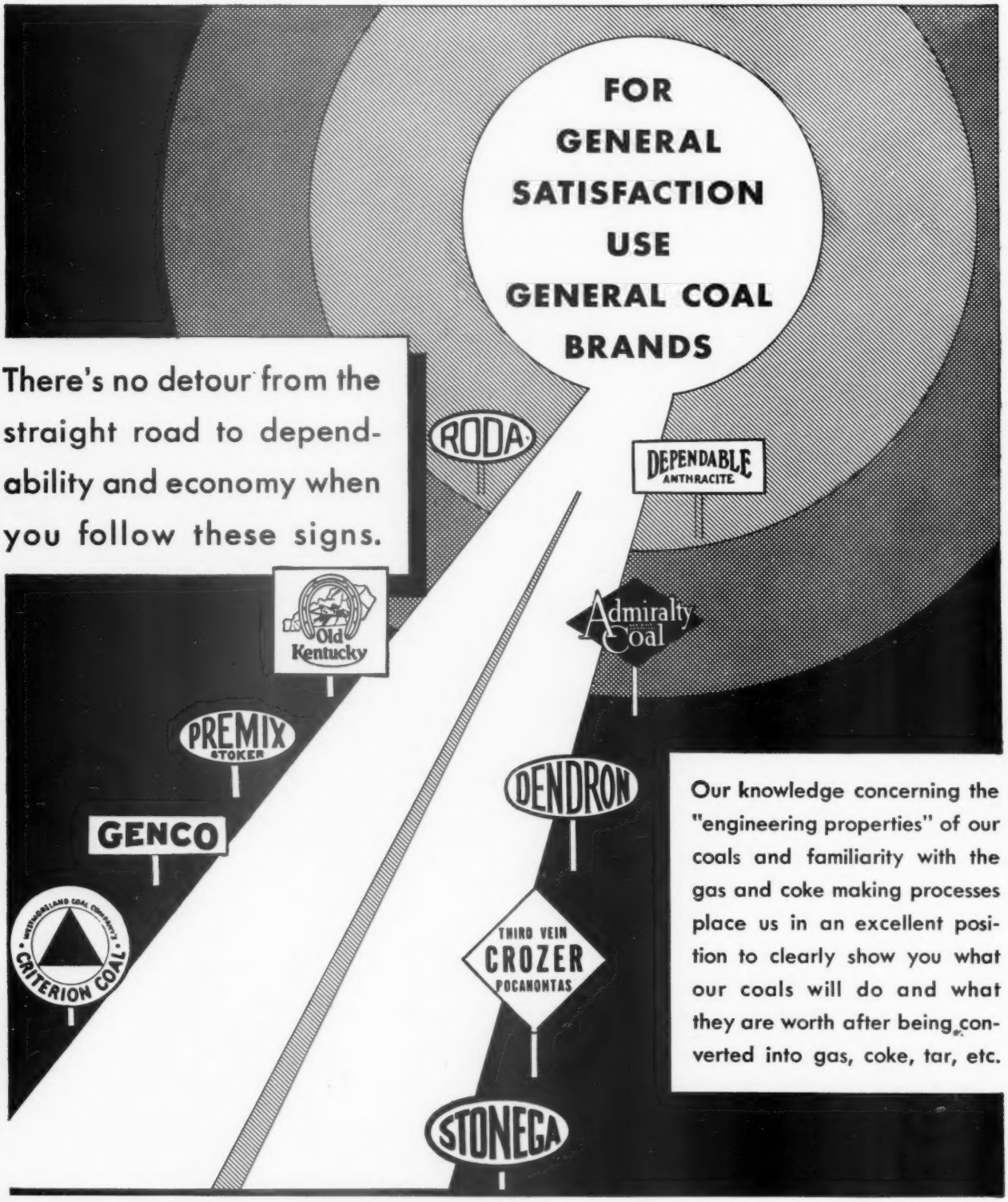
GAS COMPANY ACTION NOW

Many Gas Utilities, without the slightest interference with the war effort, are beginning to set up nucleus air conditioning departments within their own organizations. Some are already starting to survey their markets for All-Year Gas Air Conditioning. Others are preparing to train selected men and form skeleton organizations which can be expanded promptly and effectively when war ends.

Servel continues working to see that those who are winning this war will be able to enjoy the peace when it is won.

Servel, Inc.

PEACETIME MAKER OF THE SERVEL GAS REFRIGERATOR

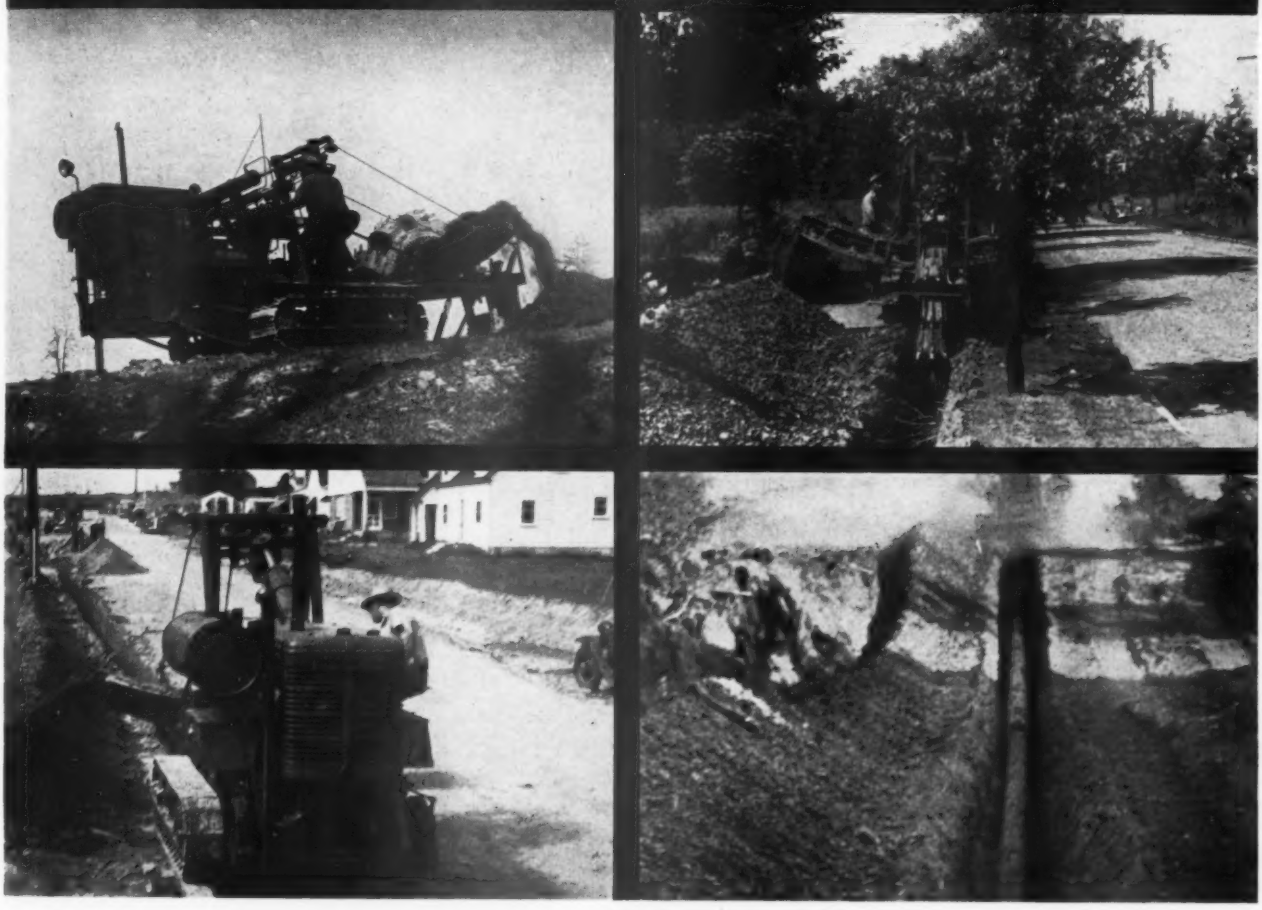

FOR GENERAL SATISFACTION USE GENERAL COAL BRANDS
There's no detour from the straight road to dependability and economy when you follow these signs.
RODA
DEPENDABLE ANTHRACITE
Old Kentucky
Admiralty Coal
PREMIX STOKER
DENDRON
GENCO
WESTMORELAND COAL COMPANY'S CRITERION COAL
THIRD VEIN CROZER POCAHONTAS
STONEGA
Our knowledge concerning the "engineering properties" of our coals and familiarity with the gas and coke making processes place us in an excellent position to clearly show you what our coals will do and what they are worth after being converted into gas, coke, tar, etc.

GENERAL COAL COMPANY

PHILADELPHIA

BOSTON CHARLOTTE, N. C. DETROIT NORFOLK CHARLESTON, S. C. CINCINNATI
NEW YORK PITTSBURGH BUFFALO, N. Y. BLUEFIELD, W. VA.

"CLEVELANDS"



MOBILE—HARD HITTING—COMMANDO TYPE PERFORMANCE IS LICKING TRENCHING JOBS EVERYWHERE

● Trenching in the close confined city areas for distribution lines — digging main line jobs across country — stripping pipe for reconditioning or take-up evidence "CLEVELANDS" versatile, rugged, mobile, fast, compact, powerful performance — features that have made "CLEVELANDS" preferred equipment by so many Gas Utilities and why "CLEVELANDS" can be found today on so many war time projects, military and civilian, global as well as national.

THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVE. *"Pioneer of the Small Trencher"* CLEVELAND, OHIO

"CLEVELANDS" Save More . . . Because they Do More

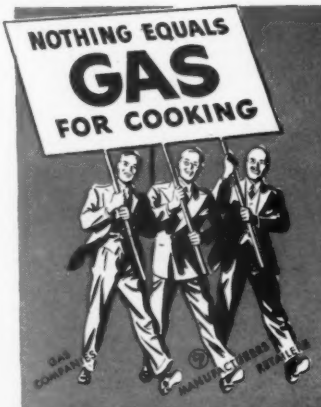
If you are looking for a success story, keep your eye on CP Gas Ranges. For CP Gas Ranges revolutionized cooking. As a result, your customers changed from "buying for price" to "buying for cooking perfection."

From the day they were announced, CP Gas Ranges became the American woman's buying guide. CP sales skyrocketed. Sales of oven heat controlled Gas Ranges climbed 141%. CP Gas Ranges prices averaged $125. The average unit selling price of all Ranges rose to $70.

After the war, new CP Gas Ranges *again* will help you build more profitable business — help keep Gas the preferred cooking fuel for 85 million Americans.

Start Today to Build for Tomorrow

Newspaper mats featuring "Buy a War Bond Today for the CP Gas Range You'll Want Tomorrow" will help you pave the way for post-war business. For proof sheets, write CP Range Division, Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd St., New York 17, N. Y.



MARCHING ALONG TOGETHER

Working hand-in-hand with gas companies and retailers all over America, these CP Gas Range manufacturers are developing an even greater CP Gas Range Program for you in the bright post-war era.

A-B STOVES, INC.
AMERICAN STOVE CO.
CLARE BROS. & CO., LTD.
THE CLEVELAND COOPERATIVE STOVE CO.
CRIBBEN & SEXTON CO.
DETROIT-MICHIGAN STOVE CO.
THE ESTATE STOVE CO.
GLENWOOD RANGE CO.
JAMES GRAHAM MFG. CO.
HARDWICK STOVE CO.
MOFFATS, LTD.
O'KEEFE & MERRITT CO.
GEO. D. ROPER CORP.
STANDARD GAS EQUIPMENT CORP.
THE TAPPAN STOVE CO.

cp *The Gas Range of Tomorrow*

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Those Projects for the Future!

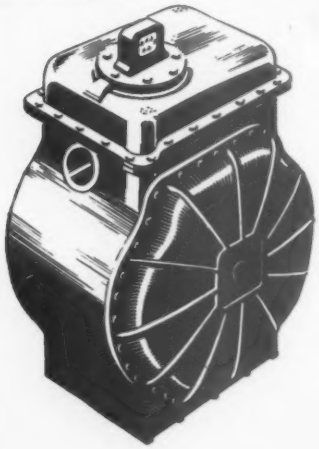
PIONEERING is ingrained in American Meter Company's organization after some 107 years of devising new and improved instruments for measurement engineering.

When the need for concentration on armament manufactures is past, projects now under development by this company's research activities will begin to see the light of day.

In view of past accomplishments, it is safe to promise that they will make fresh technological contributions to industrial measurement and control. Hostages to a progressive post-war future!

★ ★ ★

Meanwhile, our research engineering continues to welcome the stimulating suggestions which our customers have always so helpfully offered in the past.



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AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)
GENERAL OFFICES • 60 EAST 42ND STREET, NEW YORK, N. Y.

OCTOBER
1943

AMERICAN
GAS JOURNAL

VOLUME 159
NO. 4

Thoughts on Post-War Planning

By
W. Frank Roberts

President, Standard Gas Equipment Corp., Baltimore, Md.

W. Frank Roberts

INDUSTRY'S PRIMARY objective is the winning of the war. To this end the nation as a whole has solemnly consecrated itself. Nothing must divert us from our pledged course to fight through to complete victory. Because conditions on the various fronts appear to be greatly improved, we must not relax our efforts on the home front for even a moment. Our single objective must be the winning of the struggle. Any other attitude may prolong hostilities indefinitely, and increase immeasurably the number of casualities and operational costs.

This does not mean that now there is reason to believe that victory is in sight we should not begin to consider the problems that will confront us when this tremendous conflict has been won, and the world is again faced on the road to normalcy. Certainly, we must not repeat the mistakes of World War I, which, because of an utter lack of preparation, was followed by wide unemployment and industrial chaos. Such conditions after the last war were inevitable. From the day Belgium was invaded in August, 1914, until this country declared war against Germany there was a policy of laissez-faire, engendered no doubt by the general indifference of the public, so well defined in the popular slogan, "business as usual." The armistice came too quickly after this country's entry into the war for its effects to be as widely felt as now, so it is not to be wondered at that with the return of peace the new cry of the public should be "back to normalcy."

Fortunately for our nation, there is no such indifference now. The war in its actuality has been brought home to everyone. The raising of millions of men and women for the armed and auxiliary services, for defense plants and other essential industries, rationing, the curbs on pleasure driving, the restrictions on travel and the hundred and one measures of control that seem so foreign to the American way of life has shaken the ordinary complacency of our people, and awakened the national conscience to the actuality and solemnity of war.

Industry Answers the Call

One of the outstanding achievements of this war has been the ability of industry to answer the call. Its response to the national emergency has been magnificent. It has met the challenge, and justified in every sense our democratic system of free private enterprise. And in no division of the national effort has this willingness to achieve been more outstanding than in the gas industry, every branch of it—which has lent its entire resources to the war effort, with accumulated results that are contributing significantly to the winning of the war.

Resourceful and far-sighted indeed have been the executives of American business, and it is just these characteristics that have awakened them to the importance of proparing for the peace to come. They realize only too well the extent and complexity of the problems that will have to be met and solved with the sounding of the armistice, and a majority of them realize too the opportunity and the obligation of industry to lay now the foundations of a tomorrow that shall perpetuate in all its best phases our American way of life.

Thus we find today in every industry in the land an almost universal appreciation for the need of well-formulated and workable plans that will effectively guard against a recurrence of the conditions that followed the Great War, but one that will maintain as far as possible present levels of employment, wages, and standards of living.

To this end, and striving for a common objective, government agencies, planning boards, trade associations, industries, companies, and individuals are working unceasingly to formulate intelligent programs that will represent intelligent and practical procedure for the after-war. Searching for new markets is the powerful Department of Commerce, while marshalling the brains and resources of business is the Committee For Economic Development. This organization, headed by Paul G. Hoffman, president of the Stude-

baker Corporation, has branches throughout the country. It is a non-profit organization, privately underwritten, its leaders men of outstanding ability in all walks of life. Throughout the country today, indeed, practically every industry and every company of consequence are giving serious thought to preparedness for peace. Most large industries, through their trade associations—and these include our own organizations, American Gas Association and the Association of Gas Appliance & Equipment Manufacturers, and a majority of the larger manufacturing, distribution, and service companies, are creating distinct bodies to wrestle with these intricate after-war problems, and each day sees a wider appreciation of the importance of the work. The results of such co-ordinated planning, conducted by the best brains and engineering talent of the nation, are bound to be of far-reaching consequence. However, we must remember that the best planning in the world will be futile unless translated into action.

It is the Individual Company That Must Plan

We must bear in mind, also, the fact that national planning is excellent, but it necessarily is limited in scope, a sort of compass to serve as an indicator of the general path to be travelled. Planning to be effective, however, must be undertaken by the particular industry and by the individual company, for the problems are not common to all.

Personally, I am convinced that the attitude of the gas industry toward the problems to be faced when the war comes to an end will be equally as courageous and effective as they have been in meeting the problems of war. Certainly, the appliance manufacturers are alive to the problems and needs of the future. Take our own company as an example. In common with all gas appliance and equipment manufacturers we have had to divert temporarily the activities of our research and engineering organizations to the intricate problems concerned with war production, knowing that patriotism dictates that winning the war should be the single objective of American industry.

Now, however, with production running on an even keel, and with the handwriting on the wall seeming to presage an early termination of hostilities in Europe, we have commenced to give attention to the problems of peace-time production within our own industry. Our first objective has been the formulation of an intelligent plan for our successful participation in the post-war scheme of things. The problems ahead we know only too well are many and difficult, and the future uncertain, but we are prepared to meet any eventuality, and wrestle with each problem as it may arise.

Immediate Changes Improbable

In my own opinion, it is highly improbable that any revolutionary changes in the design of gas appliances will be made in the immediate after-the-war period for the very obvious reason that all manufacturers will be confronted with a very difficult period of transition in reverting to normal production. We must remember, that for the larger manufacturers, at least, this will mean total reconversion, for the equipment he has been using in the production of war instruments are unsuited for the most part for the fabrication of gas appliances and gas equipment, both as to machinery and line-up.

To me, it would seem that practically every industry in the country, normally a producer of consumer goods, will be forced to resume operations just about where it left off. The chief after-war problem will be continued employment. New designs require new dies and new tools, and, of course, time. Months are required to change production methods, and while this was going on only the research and engineering staffs would be active. Unemployment is the one condition that must be avoided if we are not again to be faced by chaos. Therefore, we can see that considerable time will probably elapse before the manufacturers of household appliances, automobiles, or for that matter any consumer goods will be able to create and produce new forms of their present products.

Certainly, this is the condition in our own industry. As is generally known, only the small manufacturer, whose gross volume of business in the period June 30, 1940-July 1, 1941 was less than $2,000,000 has been permitted to manufacture any ranges at all, and in cases where such plants were located in so-called critical labor areas even they could not. Thus, naturally, with production of ranges limited to the so-called Victory model, without accessories and minus heat control, it is natural that there have been no developments in respect to actual produced units.

In the immediate past, as has been pointed out, our industry's engineering talent has been forced to concentrate on the intricate problems at hand, which, of course, had nothing to do with appliance or equipment design, but was concerned principally with the conversion of the plant's technique to its new directives and to the solution of the problems associated with the entirely new type of manufacturing it was required to do, such, for example, as the production of wing structures of airplanes, airplane cowling, armor plate, shells, bombs, fuses, radio *and* other war equipment.

Through his connection with the war effort, the experience of the appliance manufacturer has been immeasurably broadened, for he has learned to work with new materials, and, through actual experience to solve production problems that a few years ago would have been entirely beyond his scope and vision This should have a far-reaching influence on the after-the-war technique of gas appliance production.

Must Consider New Materials

One hears considerable talk of ranges of new materials that may come after the war. I can only say in this regard, that our industry will have to take cognizance of the many new materials that have been developed in recent years, such as plastics, ceramics, and glass, as well as of the new methods of coating sheet steel that may prove to be successful substitutes for enameling and japanning. However, in thinking of new materials, we must bear in mind that with the ushering in of peace all of the restrictions on the use of metals and their alloys will be removed. It is not to be supposed that these strongly entrenched industries, with vastly expanded production and greater resources than ever, will supinely lie down and give up the ghost. No, they will be in the fight to the hilt, fighting not only to recover their peace-time markets but to extend their activities to new fields. Nor must we overlook the fact that definite advances have been made in the field of metallurgy in the past two or three years, decreasing costs, always a controlling factor in the use of materials. Take plastics as an example. I have been informed that present prices average from 15 to 85 cents a pound, compared with an average of 3 to 4 cents for sheet steel. Of course, after the war plastic prices will come down, but whether to a competitive basis in a majority of industrial practices is problematical.

Under these conditions, it is difficult to predict the new innovation and developments that may be made in the gas range of the future. Perhaps

we in the industry have been prone to over-emphasize the shortcomings of our present models. Certainly, the present gas range is in no way inferior to its electric competitor, and in many respects it is superior, being faster in performance, just as convenient to operate, and a great deal more economical. Our contemporary range is the result of many years of constant development, and in efficiency and appearance it represents an achievement of the first character. However, the appliance manufacturer realizes that his is not a static industry, and that if he is to render his public the best possible service he must work constantly toward greater improvement in the design, construction, and efficiency of his product.

Visualizing the Post-War Range

At this point a few words as to the post-war range might seem to be in order. With a return to normal conditions it is reasonable to expect that, in addition to greater efficiency, there will be modifications in the appearance of the range, a greater tendency, perhaps, to stream-lining, and the utilization of new exterior finishes calculated to harmonize with the kitchen of the future of which we are now hearing so much.

However, it must not be expected that revolutionary changes will come immediately. It must be remembered that the manufacturer has to assure himself that any innovation he may contemplate is not only practical, but will render consistent and satisfactory service, be economical to operate, and have reasonable longevity. Nor should we forget that almost the entire capital investment of the gas appliance manufacturer is in its enameling, sheet metal, stamping, and casting plants, and that the introduction of new materials as substitutes for standard practice would make at least a part of his facilities obsolete.

Yes, I hold a brief for the gas manufacturer. The work he has accomplished in the field of applied science for the improvement of his product has been notable. It is my considered opinion that a majority of the refinement in gas appliances in recent years have originated with the manufacturer. He is alert always to the voice of progress. This may be born of self-preservation, and I claim nothing to the contrary, but even this can not deprive him of the credit of having played the predominant role in the development of the equipment that has been fundamental to the growth of the gas industry itself.

After the war, no doubt, there will be certain new developments and modifications in the domestic range, such as improved automatic ignition of burners—meaning speedier ignition and greater convenience and flexibility of operation. It is probable, too, that the efficiency of the top burners will be improved, resulting in proportionate increase in operational speed. Through improved heat distribution and more precise temperature control, oven performance also may be bettered, while it is probable that the broilers' efficiency will be enhanced through the extension of their areas and a more uniform distribution of heat.

Necessarily, great attention has been paid in the past to the appearance of the range, and justifiably so, for this is one of the most important factors in its merchandising. This does not mean that there has been any sacrifice of efficiency, for quite the contrary has been the case. It is reasonable to state that the development of appearance and performance have been synchronous.

Industry's Need to Look Ahead

Now in looking to the future of the gas appliance industry there is one thing we must realize, and it is this: After the war competition will be more acute than in our time. However, with adequate planning, militant leadership, resourcefulness, and vision, gas will be able to hold its own, and for the very simple reason that it is—especially in the field of domestic cooking and heating—inherently the most efficient and most economical of all fuels. But even with this advantage the gas appliance manufacturer and the gas distributor must be constantly on guard, prepared to adopt any innovation that promises to bring greater efficiency to his product, and enable him to meet any competition that may arise. It is known, for example, that a number of manufacturers are contemplating entry into the household appliance field, which, presumably will embrace ranges and other gas equipment. Thus existing manufacturers must expect added competition in their chosen field, and to meet it they must be in a state of utter preparedness.

One of the chief instruments in the extension of the gas industry when peace returns will be research, both fundamental and applied. In the past, the laboratory has played a significant role in the development of both gas and its appliances. An important influence has been the work of the American Gas Association's laboratories at Cleveland and Los Angeles, under the able direction of R. M. Conner.

Our industry is beginning to appreciate the fact that the important work of research must not be left to the trade associations and government agencies, but that every large company, whether fuel distributor or manufacturer of appliances, should undertake its own share of experiment. In 1936, the Association of Gas Appliance and Equipment Manufacturers decided that applied research was the prerogative of the individual manufacturer. Our industry appreciates the fact that each manufacturer must undertake constant research, and is preparing to do so in an extensive way with the termination of the war.

With a return of peace, there must be co-operation between the utility, the appliance manufacturer, the dealer, and the consumer, based on mutual trust. Some definite, well-conceived policy should be developed that will provide a common ground for the discussion of our mutual problems.

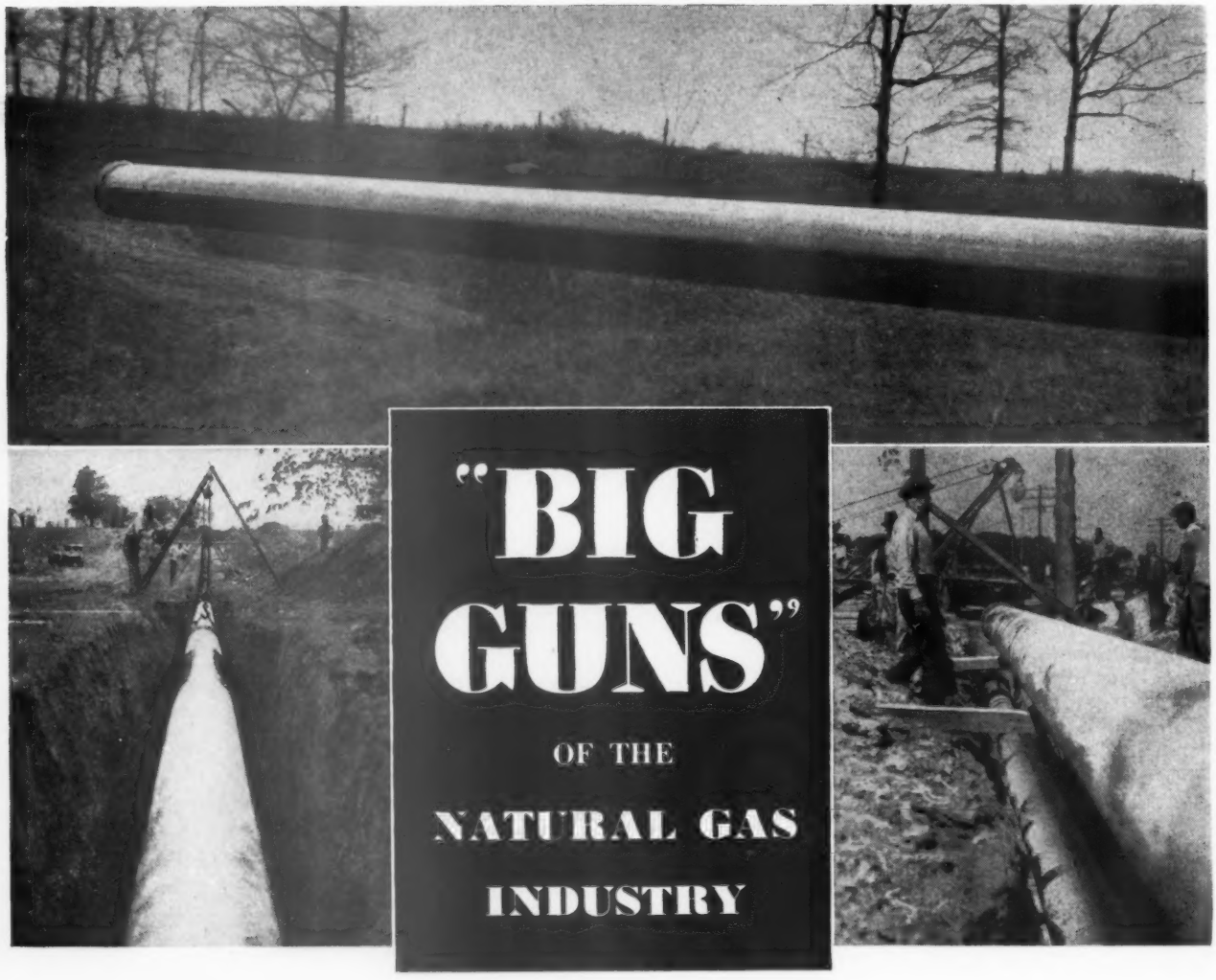
Co-operation the Keynote

After the war, gas companies and appliance manufacturers will have to do everything humanly possible to win the good-will of dealer outlets. The utility especially should carry on a consistent program of dealer education. All plumbers and sheet metal workers, it is true, are not good merchandisers, but they can be made so.

Let us bear in mind always that it is the domestic load that is by far the most remunerative to the utility for it represents the chief source of its annual revenues. Any program for the sale of gas appliances should be based on the joint organized efforts of utility, appliance manufacturer, and retail outlets.

Cultivating the Housewife

Of course, the greatest single factor in the merchandising of household equipment of any kind is the housewife, for it is she who is the final arbiter. It is not to exaggerate to state that the influence of the housewife in this field is as pronounced as in the realm of fashion. No one knows better than she what her requirements are. She spends a great part of her life in the kitchen, and therefore is in a better position to determine her preferences in appliances than the outsider. More and more we must learn to interpret in our products the exacting needs of the woman of the home. Only through cultivating the housewife and conceding to her desires shall we be able to enjoy the measure of prosperity that is inherently ours.



LIKE our nation's heavy artillery, these "big guns" of the Natural Gas industry are helping to win decisive battles for our armed forces on all the fighting fronts. Welded and coupled together, they perform functions that are indispensable to the war effort—transmitting and distributing Natural Gas whenever and wherever it is needed . . . through pipe lines that span the continent.

This industry today is performing a two-fold service to the nation. While continuing essential fuel supplies to our people, it produces and distributes gas for myriad wartime uses, including the production of sinews of war . . . ranging from explosives perfected by recent chemical advances to healing agents in the name of mercy.

Columbia System is now supplying more Natural Gas for industrial use than ever before in its history.

COLUMBIA GAS & ELECTRIC CORPORATION

COLUMBIA SYSTEM

Plastics

Their Development and Application—Their Adaptability to Desired Specifications—Their Tensile Strength and Heat Resisting Qualities and Many Other Features.

THE American Gas Journal presents to its readers, authorities on the subject of Plastics. They introduce an unexpected story of value and interest to the gas industry. Primarily, we are endeavoring to present the importance of gas relationship to plastics.

This series of short articles gives authentic facts on the following subjects:—Plastics in the war industry, new heat resistant methylmethacrylate molding compounds, vinylidene chloride polymers, plastics relation to the gas industry and other facts and figures.

The gas industry has a three fold interest in the subject of plastics.

1.—The use of coal tar derivatives in the manufacture of plastics. This offers a profitable outlet for manufactured gas by-products. Also natural gas provides the base for some types of plastics.

2.—The use of gas as a fuel has been found the most convenient controllable and economic fuel in the production of plastics. This serves to increase the industrial load.

3.—The use of formed plastics in the manufacture of gas appliances and equipment. This feature extends into pipe, tubing and molded forms for appliances.

Plastics promise a brilliant performance. They will heighten competition in the older fields—such is true—but they will also push back the frontiers of living. These last gains compose the net addition to industry's jobs after the war. Plastics are defined as the products of organic chemistry in which carbon is the fundamental substance. Such materials can be formed to a desired shape under heat and pressure.

Two years ago production added up to 400,000,000 pounds— 1943 will hit 750,000,000—or better.

Amongst the authorities contributing to this article are some of the major organizations in plastics.

We ask our readers to carefully follow plastic authorities who have contributed to the facts set forth in these articles. The American Gas Journal will be glad to obtain the answer to any questions on this subject addressed to us.

In further issues of the Journal, will appear articles on plastics, giving important developments related to the gas industry.

Pipe and Tubing

A typical example of the new plastic developments—saran pipe and tubing—resulted from Dow's close cooperation with its customers. Already these new plastic applications are replacing strategic metals and rubber urgently needed for the war program.

Saran pipe and tubing are made of a chemically resistant thermoplastic resin that is noncorrosive, nonscaling and heat resistant. They are well adapted to a wide variety of industrial and chemical installations—capable of carrying acids, water and gasoline, as well as oil, gases and air.

Saran pipe can be welded and threaded with standard plumbing tools and is easily installed with standard equipment.

Saran tubing is both tough and flexible. It is simply installed with plastic fittings, precision molded of saran, through the use of a standard flaring tool.

Laminated plastic explosive containers for use in shooting oil, gas or water wells with nitroglycerine or other high explosives.

Twisting Plastics Into Realities

AN ENTERPRISING printer named John Wesly Hyatt solved the ivory shortage problem. By experimenting with Camphor and Nitrated cellulose, he succeeded, after innumerable experiments in producing a substitute material. For this material, John Wesly Hyatt's brother coined a new name —Celluloid.

It was the world's first synthetic organic plastic. It began, almost immediately, to play an important role in the drama of industrial progress.

No single product, or a single development of the war has been more significant than the growth of the plastics industry. 78 years ago an infant, today it has attained adult stature, able to not only stand on its own feet, but to be numbered among the key industries which today are carrying on the war and which tomorrow will aid in the national rehabilitation and the shaping of the world's destinies.

Plastics are now serving as vital parts in war planes—gas masks, battleships and communications apparatus. Research that contributed so much to civilian welfare now is dedicated to the single high purpose of victory.

In turn, war time activity is accelerating the industrial revolution so that plastics will have attained a position at the end of the conflict which would have required four or five generations to reach in time of peace.

Lumarith, due to its lightness, toughness, durability, and fast production cycle, has taken over many of the jobs of rubber, metals, ceramics and other strategic materials. Hundreds of these conversions have resulted in the improved performance and a gratifying speed-up in production. All these point, not only to added strength for Uncle Sam's war muscles—but to the developments that will enrich the peace to follow.

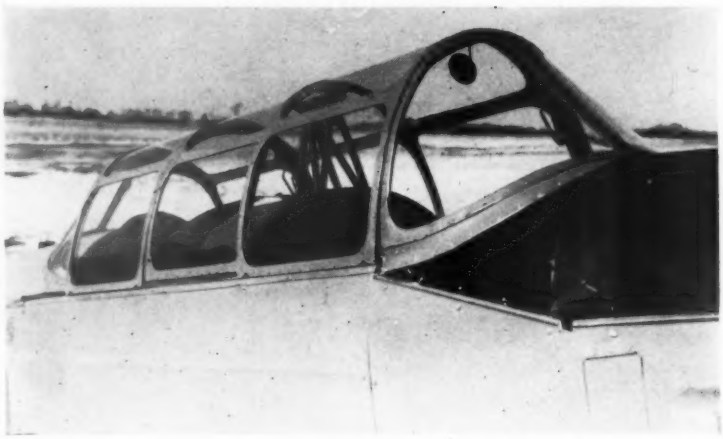
In the present century, during the new uses for cellulose plastics, many others were pioneering in the application of cellulose for other purposes. Outstanding among these pioneers was Dr. Camille Dreyfus.

Following America's entry into the war, the United States Government invited Dr. Camille Dreyfus to come to the United States and build a chemical plant to furnish lacquer for United States war planes. In 1918 the American & Chemical Manufacturing Co. was incorporated and construction of a plant near Cumberland, Maryland, began under Dr. Dreyfus. He later turned his attention to the field of textiles, in which he soon attracted world-wide recognition. The outgrowth has been the establishment of Celanese Corporation of America, and development of the entire celanese group of fibres and fabrics so well known to every designer, clothing manufacturer, every woman in America.

Enter Cellulose Acetate: use of cellulose acetate began approximately five years before the 1st World War broke out in Europe—for some time attempts had been made to arrive at a type of photographic film which would be less of a fire hazard than the nitrocellulose base film commonly used. Success was achieved in 1909, through the use of comparatively non flammable cellulose acetate—this development was the real beginning of the amazing industrial career of this versatile organic material.

Simultaneously Dr. Camille Dreyfus—now of Celanese Corporation of America was exploring many other fields for cellulose acetate uses—one of the most dramatic of his developments was non-flammable airplane fabric dopes, which had contributed in a major way to the Allies.

There is no limit to the versatility of plastics and other wonderful materials—and as you read along—the various illustrations will give you a vivid picture how indispensable plastics are to all arms of the service—it is impossible to exaggerate the important part of plastics in the present struggle—not only in this country but in Canada, Great Britain and other countries in the making of airplanes, wings and parts, parachutes, gas masks, gun turrets—ship telegraphic systems, lenses and instruments of all kinds. —the Army Signal Corps is said to be purchasing seven million dollars a day—Stephen H. Sherrill, Commanding General, Western Signal Corps training center says that there is hardly an electrical cir-



AERO QUALITY LUMARITH GLAZES MANY OF OUR PLANES AND GLIDERS

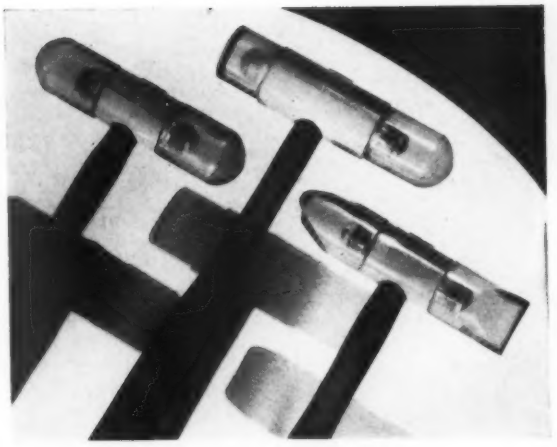
This superior cellulose acetate plastic was especially developed for the aviation industry. It has remarkable impact strength and abrasion resistance, is one of the lightest materials known, is easily fabricated and can be cleaned with a damp cloth. It prevents the transmission of most of the severe ultraviolet rays which cause sunburn . . . a very important quality to pilots flying under North African skies. The Lumarith cockpit illustrated is the Cornell made by Fleet Aircraft Ltd., Port Erie, Ontario.

Lumarith* is a product of Celanese Celluloid Corporation, a division of the Celanese Corporation of America. *Reg. U. S. Pat. Off.

cuit in all fields of operation which, without plastics, would not become a short circuit.

Here is something interesting. The modern battleship is said to have nearly 48,000 plastic parts, and it is true that the majority of American combat vessels depend on these new materials for their electrical insulation—one of the outstanding developments has been the ability of the plastic material to meet the rigid tests of modern warfare. Take for instance—the trench shell mortar fuses which must be held in tolerances of as low as a thousandth part of an inch.

There are so many examples of how the Plastics Industry is meeting the demands of war. Shortage of rubber and aluminum was threatening seriously the normal production of binoculars for the United States Navy—the Navy called on every authority on plastics, and in less than a month the technical committees had provided a synthetic substitute for both of these materials — plastics is an armored car to all emergencies — which I am sure Dr. Gordon Kline, Chief of the Plastics Section, National Bureau of Standards will confirm—he will also confirm that in the thermoplastic division there are more than twenty-eight scientists and numerous assistants who are working constantly in testing countless numbers of plastics to see that they conform with the rigid specifications that the Bureau demands of all materials to be used by the armed forces, not overlooking the importance of producing new types of plastics products as of the new light cellulose acetate now employed in a large way in the manufacture of a transparent weather resistant material for aircraft that effectively absorbs ultraviolet light. As we have already stated, the growth of the plastics industry since the outbreak of the European war has been phenomenal.



The tools of War are made of plastics wherever possible. . . . Here are Bonney hammers with Amber Celluloid* (cellulose nitrate plastic) ball and peen tips that do not mar the delicate airplane surfaces they strike.
Celluloid is a product of Celanese Celluloid Corporation, a division of the Celanese Corporation of America.
****Reg. U. S. Pat. Off.***

Metal gun parts have been replaced with plastics wherever possible. Shown here are pieces molded of Lumarith, a cellulose acetate plastic, that has remarkable impact strength, is one of the lightest materials known and is impervious to rust and corrosion. Lumarith* is a product of the Celanese Celluloid Corporation, a division of the Celanese Corporation of America.
****Reg. U. S. Pat. Off.***

One must not conclude from this, however, that this development has been the result of war demands; evidently this is far from the truth. In the years immediately preceding the invasion of Poland plastics were not only holding their own but increasing in importance annually. In 1931, for example, according to the United States Census of Manufactures, the total value of all plastics produced was approximately $20,000,000, or ten million dollars less than in the so-called boom year of 1929. By 1939 reflecting the growing importance of these materials to industry, aggregate production amounted to approximately $40,000,000, this figure representing a gain of twice the depression loss and an increase of more than 100 per cent over 1929. In 1939, the year of the decennial census, production had reached the figure of $80,000,000, and while actual present figures are not available, it is believed that production is now running at the rate of $225,000,000, this estimate being based on the Department of Commerce preliminary figures of $130,000,000 for 1941. It must be remembered, too, that only the cost of the plastic materials is calculated, no consideration being given to added value through processing, which would probably bring a present value to the industry of at least half a billion dollars.

Plastics has become a word with which to conjure, and today there are not many forward-looking executives who are not evincing an interest in them, some wondering in what way they may be used in their own practices and others asking themselves how great the measure of competition they may expect from this new and potentially powerful rival.

Widespread, indeed, has the interest in this growing branch of the great chemistry industry become, and some go as far as to predict that plastics are destined to usher in a new age, comparable to those of wood and steel. These are extremists, optimists, connected with the industry—however there is always a middle road—and it is essential to face the facts—plastics are not merely substitutes. They have a very definite place of their own—and the executive of the plastic age appreciates the eminent fact. It is incontrovertible that plastics are a 100% efficient and not infrequently superior to other materials—one great advantage of plastics materials is the ability to adjust the formula to the desired specifications of tensile strength, machinery characteristics—chemical and heat resistance di-electric properties, and the various other particular colors and surfaces properties that can not be thus predordained with metals and substances.

There are two types of plastics, thermosetting and thermoplastic. Thermosetting are those that once formed cannot be changed; the thermoplastic, those that can be melted and reformed at will.

It is the heat and pressure resistant properties of the thermosetting plastics that have led to their

Handles and knobs of this stainless steel cooking ware are produced from Bakelite heat-resistant phenolic plastics.

wide employment for telephone sets and handles for cooking appliances. One type of phenolic plastic, for example, is said to have withstood a pressure of approximately 170,000 pounds to the square inch. They would be ideal for the gas industry, but their present costs make their use prohibitive. The thermoplastics, on the other hand, are not quite acceptable because there is a critical temperature range of from 150 to 180 degrees beyond which they cannot go. All thermosetting plastics are non-flammable but under existing conditions it would be exceedingly difficult to manufacture pipe of any length because under present practice it has to be molded from dies made for the particular purpose.

Probably you are asking what plastics are derived from—the general opinion is—coal, air and water and this definition was true—but not today—for many and varied are the raw materials in use embracing coal, limestone, petroleum, natural gas, salt—cotton linters, wood celluloses, casein, (derived from milk)—and other proteins—one of the chief bases of the plastics of the future maybe lignin the principal non-cellulose content of the living tree—actual plastic materials are produced by manufacturing chemists. They are unprocessed, and come in powder flake or liquid form and not infrequently in semi-finished sheets, tubes and rods.

The story of the American development of the chemical industries, based on petroleum and natural gas, is the fascinating tale of the past two decades says Reginald L. Wakeman, Industrial Fellow of the Pittsburgh Equitable Meter Company, Mellon Institute, Pittsburgh, Pa., a recognized authority on synthetic resins and plastics—and his achievements should be of interest to all who are interested in the future of plastics.

The question is very often asked "Why are there so many varieties of plastics"? Bakelite Corporation answers this question by saying that each type of plastic has virtues that may not be duplicated in any of the others. Therefore, it depends upon the properties or combination of properties required in the finished molded part as to whether the material selected is phenolic urea, acetate or polystyrene. For example phenolics may have a better combination of properties than all other plastics so far as dimensional stability, electrical insulation and mechanical strength are concerned—but if brilliant color and high lustre are all important and if certain other properties can be sacrificed—another molding material such as urea, polystyrene, or acetate will probably do as well.

Where you come across the word Laminated — it means — consisting of or arranged in layers in their plates, one upon the other. Laminated plastics are produced by the applications of heat and pressure upon superimposed layers of paper or fabric which has been impregnated with a body Bakelite heat-reactive resinoid varnish—the various laminating processes are illustrated on the following pages.

So let's travel on.

Making a Good Tool Better

By Robert Schumann, Chief Engineer, Precise Products Company

WHEN the high-speed high-power Precise 35 Electric Hand Tool was introduced about two years ago, the need for a housing material which would be tough, light in weight, and an effective insulator against operating heat and electrical shock immediately prompted the adoption of phenolic molding plastics. Since that time, plastics have found their way into the interior construction of this tool with equally outstanding results. Due to this adaptation of plastics throughout the design and due to the ultra-high-speed motor of 35,000 r.p.m. and 1/6-1/5 hp., the weight of this handtool could be reduced to 35 ounces so that its maximum output increased over 100 per cent up to 3.6 watts per ounce of weight—another of its outstanding features.

A small but extremely important part of the Precise 35 is the ball-bearing chamber located immediately next to the commutator. Formerly made from metal, this chamber offered considerable trouble in earlier models, since carbon dust from one brush to the other formed a "bridge" to the metal chamber. This resulted in a "shunt" which tended to burn and deteriorate the adjacent section of the plastic housing.

By using a non-conducting material for the chamber, it was obvious that these difficulties would be eliminated—provided that that material chosen had adequate mechanical strength as well. Investigation resulted in the selection of a laminated plastic for the part. Machined to form a cylindrical cup, sealed at the open end with a thin disk of the same material, the laminated plastic provides a completely insulated yet extremely durable chamber for the four-ball bearing.

The plastic chamber and its closely fitting disk serve two important functions in addition to eliminating electrical difficulties. Closely held together by a spring, they make the bearing completely dustproof and gritproof. They also allow an adequate reserve of lubricant to be retained. By removing the plastic disk and its holding spring, the chamber can be easily refilled with lubricant—a feature not found in conventional double-sealed ball bearings. Furthermore, the plastic construction simplifies disassembling of the entire armature set when this is necessary for cleaning and other purposes.

Wide use has been made of Bakelite plastics in the construction of the Precise 35 Electric Hand Tool.

Vinylidene Chloride Polymers

by W. C. GOGGIN and R. D. LOWRY

SOME one-hundred-and-three years ago, the French Chemist, Regnault, in his studies, encountered a strange new fluid which was later determined to be unsymmetrical dichloroethylene, now more commonly known as vinylidene chloride. From that time until the beginning of the last decade, this material has been in literature only rarely.

In 1922, B. T. Brooks indicated that halogenated ethylenes other than vinyl chloride and vinyl bromide show a tendency toward polymerization .Staudinger and Feisst, reporting in 1930 on the polymerization of an apparently impure unsymmetrical dichloroethylene, indicated that the liquid polymerizes quickly in light or slowly when kept in the dark. This polymeric material is completely saturated, and its structure is represented by the long chain $-CH_2-CCl_2-CH_2-CCl_2$. Feisst reported the polymer to be crystalline, as later confirmed by G. Natta and R. Rigamonti.

The development of vinylidene began actively over a decade ago. Research men investigated the material while working on chlorinated aliphatic compounds. Based on that original study, a thorough program on vinylidene chloride was instituted. As a direct result of that program, it was possible to introduce the first vinylidene chloride polymers in a commercial way early in 1940.

Chemical and Physical Structure. Vinylidene chloride has petroleum and brine for its basic raw materials. Ethylene, made by cracking petroleum, and chlorine, from the electrolysis of brine, combine to form trichlorethane, which is converted to vinylidene chloride. It is a clear, colorless liquid having a boiling point of 31.7°C. and has the structural formula $CH_2=CCl_2$. Here the large spheres represent chlorine and the small spheres, hydrogen.

Vinylidene chloride can be readily polymerized to form the long, linear. straight chain polymer. By selection of copolymers and control of the polymerization conditions, polymers may be formed which have softening points ranging from about 70°C. to at least 180°C. Soft, flexible materials to hard, rigid materials can be obtained. Present commercial polymers have softening points from about 120°C. to 140°C., with a molecular weight of approximately 20,000. These polyvinylidene chloride plastics are known by their trade name, "Saran," and for simplicity, will be so identified hereinafter.

Characteristics of Saran

One of the outstanding characteristics of Saran is its resistance to chemicals and solvents. At room temperature, it is extremely resistant to all acids and to all common alkalies, except for concentrated ammonium hydroxide. Slight discoloration with little change in mechanical properties will occur when exposed to concentrated sulphuric acid or caustic over long periods. It is substantially unaffected by both aliphatic and aromatic hydrocarbons, alcohols, esters, ketones, and nitro-paraffins. It is swelled or softened only by oxygen bearing organic solvents such as cyclohexanone and dioxane. The resistance to chemicals or solvents decreases with a rise in temperature. The resistance of Saran to any chemical is in part a function of the crystallinity of the polymer. It is chemically more resistant in the crystallized form than in the amorphous state.

A second important characteristic of Saran is its extremely low water absorption and vapor transmission. According to A.S.T.M. test No. D570-40T over a period of twenty-four hours, it shows a water absorption of 0.0 to 0.05%. This low value accounts for its dimensional stability and freedom from warpage under a wide range of moisture exposure conditions. The low water vapor transmission or permeability of Saran is exemplified in the following test:

A .001" thick Saran film tested in a Thwing-Albert vapometer at 45°C. (113°F.) transmitted only 1-3 gms/sq.m./24 hrs. These tests were run with the apparatus in dried recirculated air using water in the vapometer. This resistance to moisture transmission is at least five times that of the best commercially available organic film.

Saran is thermoplastic and has a definite softening point which limits the temperature at which it can be used. Since softening points vary with composition, the upper limit of operating temperature can be varied from 150°F. or lower, to 250°F. From the standpoint of fire hazard, exposures to much higher temperatures are not dangerous since Saran is not flammable.

The basic polymers are odorless, tasteless, and non-toxic. Their high

To a greater or lesser degree, Saran exhibits regions of crystal structure. This property can be demonstrated readily by its X-ray diffraction pattern. Most organic thermoplastics exist in an amorphous state and do not exhibit crystallinity. Under special conditions Saran can be made amorphous. When allowed to return to room temperatures, Saran gradually changes to its normal crystalline state, showing the ring-like diffraction pattern. Amorphous Saran can be converted by mechanical working to an oriented crystalline state, showing the lattice diffraction pattern.

The three physical conditions of Saran, namely, amorphous, its normal crystalline state, and oriented, can be shown by viewing specimens through crossed polaroids, one part of which has been recrystallized by heat treatment, and the other section of which has been recrystallized and oriented by mechanical working. Refractive index enhances their many color possibilities, while their toughness and abrasion resistance are of a high order, and the retention of these

properties upon aging insures excellent wearing qualities.

Fabrication Development and Applications. The fabrication of Saran presents many interesting problems. It can be fabricated by conventional thermoplastic practice, and, due to its normal crystalline state, it is susceptible to working by various methods. In order to conserve the time and investment necessary for the fabricator to produce a finished product, as well as to supply a continually expanding background of technical service, the materials, processes, and equipment are being subjected to intensive study and development.

Saran is adapted to the conventional method for extrusion of plastics. Modified screw type extrusion equipment is used. While these modifications are relatively minor, they are absolutely necessary for the successful extrusion of Saran. Designs permitting streamline plastics flow are desirable. Since iron and copper base metals catalyze the thermal decomposition of Saran in hot zones above 130°C., it becomes necessary to select other suitable metals for these heated sections. The metals which can be used in contact with Saran above about 130°C. are magnesium alloys, nickel, and nickel base alloys such as Z nickel, Hastelloy B. Stellite 19, and impervious hard nickel plate.

The extrusion of Saran includes supplying a uniform rate feed to the screw machine hopper, mixing and heating the plastic as it is forced along by the screw, and then forming it as it passes through the die. The extruded shape may be cooled and subsequently heat treated.

Saran may be fed to the extrusion unit as a powder or as granules. The powder presents no bulk problem with the screw machine and eliminates a costly milling operation. This powder, as originally manufactured, is conveniently and inexpensively plasticized, pigmented, and colored by ball milling.

Thorough melting is of prime importance in the extrusion of Saran. To accomplish this, it is necessary to heat the material to above its crystallite melting point. In this condition, the product becomes completely amorphous.

Saran has a narrower softening range than most other thermoplastic materials When the material is heated above this narrow softening range, it can be extruded in a very fluid state. Under these conditions, no plastic memory is encountered, thus making possible the retention of the desired shape and surface.

The product, when first extruded and cooled, is soft, weak, and pliable. If it is allowed to remain at room temperature without further treatment, it will gradually harden while partially recrystallizing at a slow rate with a random crystal arrangement. By heat-treatment, recrystallization can be produced at controlled rates. Recrystallization time can be regulated from a few seconds to several weeks. For any one formulation, the rate of recrystallization is a function of the temperature. It is interesting to note that an increase in specific gravity occurs during recrystallization.

The control of extrusion and heat-treatment of Saran permits a range of properties to be obtained. Tensile strengths can thus be controlled from 4,000 lbs./sq.in to 12,000 lbs./sq.in. hardness from 60 to 95 (Rockwell Superficial 15y), elastic elongations from 10% to 40%. Such products have good fatigue life as illustrated by the following example:

Specimens of 5/16" tubing having a wall thickness of 1/16", when flexed through a 15° arc 1750 times per minute for 2,500,000 cycles, are unruptured. In comparison, standard 1/4" copper tubing failed after about 500 cycles in the same test.

A few of the applications of extruded Saran which appear of interest include: rods for making gaskets, valve seats, ball checks, medicinal probes; chemically resistant, flexible tubing and pipe; tape for warping joints; chemical conveyor belts; tape and strips for die cutting; and various items of wearing apparel.

Injection molding offers a second fabrication method for Saran. This method makes possible the producton of intricate shapes having properties similar to those obtained by extrusion as mentioned above. Here again, the equipment involved consists of the standard conventional type injection molding machines modified only as to contact metals and designs through the heating tunnel or cylinder. The fundamentals of design include the same contact metals as listed for extrusion, strict streamlining, and the reduction of the thickness of plastic sections in the heating zone. Conventional injection molding die designs and die metals can be used.

The injection molding of Saran is unique. With other commercial thermoplastics, the use of cold dies hastens the cooling of the plastic part and shortens the cycle. With Saran, the reverse is true. Cold dies produce soft, flexible, amorphous pieces. Rapid hardening is accomplished by heat-treatment producing recrystallization. This is done by using heated dies. For normal sections, this permits short cycles. When heavy sections are involved, heated dies allow the section to retain its heat, and thus it recrystallizes rapidly. Under these conditions, Saran can be ejected from the diet at temperatures as high as 100°C. in a strain-free, warp-free, dimensionally stable form. This, of course, promotes very rapid cycles with heavy sections. In fact, moldings have been produced with quarter-inch sections in a 17 second cycle.

Injection molded Saran is playing a part in national defense. Many of its applications have been replacements of metals and not other thermoplastics. Comparative tests showed that, in many instances, Saran was the only material that would satisfy the industrial requirements for the replacement of such strategic materials as nickel, aluminum, stainless steel, and rubber in applications requiring chemical resistance.

A few examples of industrial applications are:

1. Spray-Gun handles—chosen because of solvent and abrasion resistance; — replacing aluminum. Here the practice of cleaning the equipment by washing in potent lacquer solvents does not affect Saran.

2. Valve seats—chosen because of freedom from channeling based on abrasion resistance, its seating qualities based on its resilience, and in some applications, its resistance to corrosive gases and liquors;—replacing precision machined metal seats and imported horn seats. In one type of valve, Saran, far outperforming any previous metal seat, showed no air leakage after 15,000,000 cycles of operation.

3. Acid dipper—chosen because of acid resistance and toughness;—replacing glass in hard usage where much breakage was encountered.

4. Moldings for the rayon industry such as spinnerette couplings, gasket holders, filter parts, nozzle tips, rollers, guides, etc.—chosen for its inertness and stability to chemi-

cals and solvents used in processing rayon;—replacing special formulations of hard rubber.

In addition to the above uses, Saran is now being called on for the more familiar general type of plastic application. Its good mechanical characteristics, range of attractive colors, and favorable economic outlook point to a promising future for Saran in the injection molding field.

Like other thermoplastic materials, Saran can be compression molded. It differs from the other thermoplastic materials only in that it requires the same selection of metals for the dies as are above listed for hot zones in extrusion equipment. However, like other thermoplastic materials, the economic considerations usually favor injection over compression molding.

A third method of fabrication, that of crystal orientation, brings out new properties of Saran. The oriented form is produced by extrusion, subsequent plastic deformation, as by stretching, and heat-treatment. It is thus possible to obtain resulting uni-directional properties.

These uni-directional properties of high tensile strength, great flexibility, long fatigue life, and good elasticity are particularly desirable for small monofilament sections where the load is along the longitudinal axis. In larger, non-circular sections such as tapes, ovals, and semi-circles, the desired degree of transverse orientation can be realized and accompanying transverse properties controlled through the introduction of other factors in the continuous process. For example, a rolling operation incorporated after the quenching step produces some flattening and transverse elongation of the strand with a resultant increase in transverse strength. Other processes involving mechanical or recrystallization control are also available for desired modifications of directional properties. With a range of plastic formulations and the flexibility of the above process, a variety of continuous sections with required properties can be produced.

Extruded and oriented sections are now being produced for textile uses, ranging in size from .007 inches to .100 inches in circular monofilaments, and in other shapes having maximum dimensions up to .200 inches. These materials have shown adaptability to standard textile operations and have been fabricated by braiding, weaving, knitting, and twisting. While many uses now exist for monofilaments in the sizes commercially available, still greater fields await single and multiple fine fibers having the properties of oriented Saran.

Many uses of Saran monofilaments fall in fields formerly supplied by imported natural products, such as hemp, long fiber paper, reed, rattan, horsehair, Spanish silkworm gut, and linen. From the results obtained, it appears that these substitutions will be permanent. A range of typical examples might include:

1. Filter Fabrics. Saran's extreme chemical resistance suits it for this use. Since it is a thermoplastic, the question of upper operating temperature limits immediately arises. Even at a temperature above that of boiling water, Saran still retains half its original tensile strength. Normal strength is regained on cooling to room temperature.

2. Special Ropes. Saran's high wet strength and its chemical and fungal resistance have directed its use to special ropes and cores for wire ropes.

3. Articles of Apparel. The general attractivenss and range of color possibilities fit Saran for such apparel accessories as belts, suspenders, handbags, and shoes.

4. Upholstery Fabrics. Long life, ease of cleaning, abrasion resistance, and flexibility, as well as color possibilities, have attracted upholstery fabric applications to Saran. Saran in subway transportation seating shows no material wear and appears like new after a hard service period of over a year. Saran upholstery fabric is now being used in train and bus seats, as well as household furniture and automobile seat covers.

In addition to the methods of fabrication so far discussed, there are other operations based on Saran's combination of thermoplasticity and crystallinity, which have been used in forming the plastic. These operations include drawing, forging, blowing, rolling, stamping, and welding.

Heat-Resistant Phenolics

IN MANY applications of moldable plastics it is desirable to have greater heat resistance than can be obtained with Class 1 General Purpose phenolic molding materials. Thus, mineral-filled heat-resistant materials have been developed. Class 3 Heat-Resistant phenolic materials are somewhat more difficult to process in the tabletting and molding operations than the cellulose-filled materials, and parts molded from them are less easily machined. This, of course, is caused by the presence of a mineral filler.

These materials are employed when higher heat resistance and better water resistance are desired. Furthermore, they have a lower coefficient of heat expansion and lower shrinkage in the molding operation.

A number of these materials has been developed, each especially suited to a particular type of service. Applications include molded

Lustrous black electric toaster base and fitments molded from Bakelite heat-resistant plastic material.

commutators, heater connections, handles of cooking utensils and other uses where the special property of better heat resistance is required.

***Type 1*—Medium Heat-Resistant Phenolic Materials**

Low gravity materials for heater plugs and similar applications. At temperatures up to 392°F. (200°C.) ordinary heater plug parts carefully molded will not blister. They will also retain their original strength very well.

***Type 2*—High Heat-Resistant Phenolic Materials**

These materials have the highest resistance to heat and are employed for heater plugs and cooking utensil handles which may be subjected to temperatures up to 450°F. (232°C.)

Plastics Go a-Fishing

Polystyrene applied to fishing net floats and needles

WITH the meat rationing in full swing, fish and fish products assume a vital role in keeping our nation's larder filled. And, once again, Bakelite plastics are playing their part in the war program. This time it is polystyrene.

Commercial fishing is an art quite unlike pleasure fishing. Fish nets, or seines, are all-important to commercial fishermen, and these nets must be supported at intervals by floats. One of the foremost float manufacturers in the business is J. H. Shepherd & Sons. All Shepherd floats were once made of galvanized steel sheet, but about three years ago Irving Shepherd became interested in applying plastics for this purpose. Several types of molding plastics were tried and it appeared that a cellulose acetate plastic would be highly satisfactory, particularly because it is resistant to the solution used in cleaning and conditioning nets. Today, however, all Shepherd floats are made of brightly colored transparent polystyrene because of certain service conditions encountered in commercial fishing.

Although it may not be generally known, nets in commercial fishing are suspended at various depths underneath the water. This is accomplished by means of floats fastened to the top of the nets, and sinkers fastened to the bottom. These nets are suspended at depths of 25 to 300 or 400 feet, according to the section of the ocean or lake in which they are used. Tests revealed that the cellulose acetate floats will not stand the pressure of water in depths over 200 feet and were not recommended for depths over 100 feet. They failed by collapsing in periods of from 28 to 48 hours.

Today, the firm does not hesitate to recommend polystyrene floats for depths as much as 1,000 feet. Polystyrene, because of its high water resistance and excellent flexural and tensile strength, does not fail under such conditions.

The smallest floats in the illustration is in service on the Great Lakes and represents the quarter of a million that have been put to use without failure. The other sizes are in use on the East and West Coasts. These floats are subjected to rather severe use, as they are hit against the sides of boats when being lowered and raised, but their impact strength is such that they have stood up satisfactorily.

The needles in the illustrations are also molded of polystyrene. They are used in repairing nets and are required to have rigidity and strength.

FREQUENTLY it has occurred in the history of industry that two concurrent and apparently unrelated developments of major importance eventually link together to the great advantage of civilization.

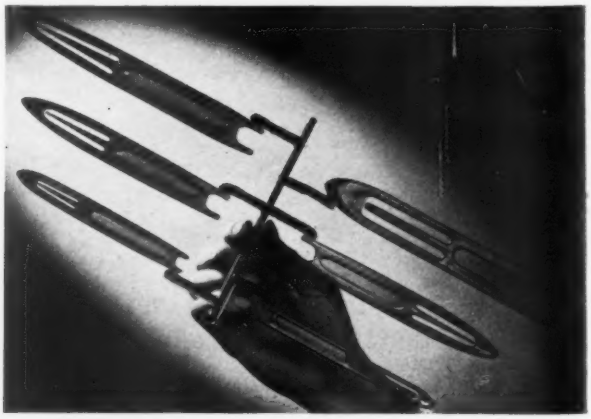
Two such industrial evolutions are shaping up, each to have profound effect on post-war industry, one in the line of materials, and the other may be classified as a facility.

The "materials" are, of course, plastics in their many forms and qualities. The other is electronics, which supplies a controlling or operating facility which is used by the medical profession and the steel mill with equal advantage.

The connection between these two developments comes in the use of the electronic high frequency in the heating and curing of plastics, either on the rolls or in the molds.

Thus another big step is taken in the direction of perfecting the quality of the fabricated material which is destined to have such a wide application in every conceivable walk of post-war life.

Fishing floats produced from Bakelite polystyrene molding material.



Needles, used in repairing fishing nets, molded from Bakelite polystyrene material.

Palm Reading the Hand of Mars

THE GREATEST difference between animal and man is that man thinks, imagines and does something about his future actions. Sometimes, some men's mental gymnastics lead to muscle-bound absurdities, such as conceiving plastic chicken coops and grazing fields fenced with plastic barbed wire. Because plastics is a new and fascinating subject, futurists gleefully conceive ferryboats, garden hose and transparent snowsuits, when, perhaps, the materials already in use for these items still have the greatest utilitarian value.

However, between the Rube Goldberg inventors and the It-Can't-Be-Dones, is a group of practical planners who contribute new and useful things for living, where plastics have their place.

Busy as they are, practical designers who are now working with development of plastic contrivances for war have found time between armaments to design for the application of these same synthetic resins for the day when peace returns. Among the many are the plans of three men who have a sense for the new but temper their dreams with the practical utility of plastic.

One of these is a young Chicago architect, Philip Will, Jr., who knowing that sturdy, durable plastic-bonded plywoods are now being molded into bomber parts, suggests prefabricated structural wall sections. He suggests mass produced panels that allow for custom-built walls with individuality and that these be formed in one unit from three sections of plywood with the inner section corrugated. This inner section gives it strength and rigidity. Where's the plastic? New plastic glues worked by the new induction heating principles will, he says, make this panel quickly into a monolithic unit—and right on the site of building construction.

Philip Will, Jr., Chicago architect, suggests mass production of wall panels for home construction. In his prefabricated walls three sections of plywood, with the inner section corrugated to give great strength, will form a panel, and, although the panels will be produced in mass quantities, their uses in each new home will actually transform them into custom built walls.

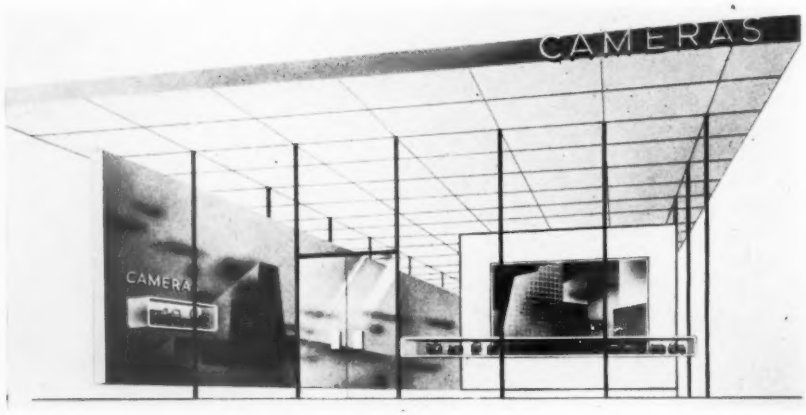
Egmont Arens, New York industrial designer, visualizes construction lumber made of plastics-bonded plywood which could be produced literally by the mile. In his development, Mr. Arens pictures plys of wood veneer impregnated with plastics bonding material being wound transversely over an oval-shaped mandrel. The wood, free from knots and flaws, would carry a load approaching steel and aluminum in construction.

Another top-flight designer who engineers in plastics is Egmont Arens of New York. He thinks in terms of plywood bonded with plastic, but with a different view. Arens visualizes structural lumber produced almost literally by the mile. Plys of wood veneered with a plastic bond would be wound transversely over an oval-shaped mandrel.

"Free from knots and flaws, Plyfold lumber could be built to exact engineering specifications," Mr. Arens points out. "It would actually approach steel and aluminum in strength per pound. Being plastic permeated, it would resist warpage, rot or insect attack."

Then there is the practical suggestion of Architect Morris Ketchum, Jr., of New York, who was intrigued with the new battery case developed for a Walkie-Talkie, made by the way of Monsanto's Lustron. Lustron being lightweight, water and weather resistant polystyrene, Ketchum thinks of a complete store based on war time developed materials. No, it would not be entirely made of Lustron for this might

Morris Ketchum, Jr., New York architect, started thinking about the Lustron battery cases made for the Army's Walkie-Talkie radio sets and went on from there. Now he is thinking in terms of a store employing the best characteristics of plastics construction and designed to take full advantage of modern architecture and the qualities of new materials.



Ketchum's store will look something like this when he gets through putting to use all the new things being born during war.

And remember that this design is utilizing things we have now, not things he hopes will be developed in the future. It's no day dream, it's a working plan.

be as absurd as the thoughts of plastic chicken coops or all plastic ferryboats. Where do plastics belong in this future store? They are present, but other building materials also have their proper place.

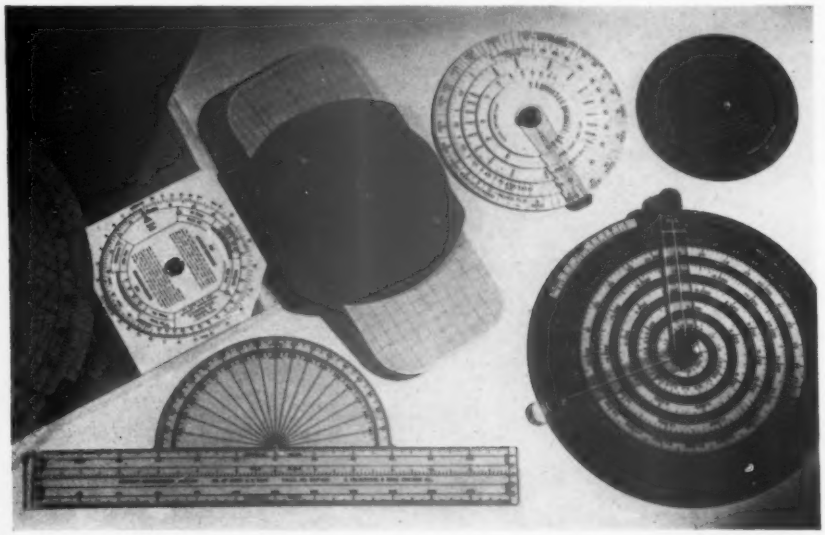
And so, like these, other new plastic usages are being worked upon as time permits between the designing of plane parts or plywood planks for PT's. These are the practical things—even though they are not in the full and finished forms that will enter the post-war world in which we hope to live.

Plotting A True Course

AIRCRAFT navigational instruments cannot be just "good enough." Lives—and even battles—depend upon the accuracy of their fabrication and the uniformity and dimensional stability of the materials from which they are made.

Most of these computers are now made of Vinylite rigid sheet, a material which fills the most exacting requirements. These sheets, clear or colored, are tough, and because of their low moisture absorption and lack of volatile plasticizing agents do not warp or shrink under the varying conditions encountered in use.

One of the best illustrations of the use of Vinylite plastics for navigational instruments is the E6B Aerial Dead Reckoning Computer, is shown above in the center. Originally made in aluminum and then in brass, it is now fabricated entirely of Vinylite rigid sheet. Its weight has been reduced from sixteen ounces when made of brass to only four ounces and its cost is less than half that of the aluminum computer. An equally important improvement is the use of fluorescent ink permitting its use under Ultra Violet (black) light.



Aircraft navigational instruments produced from Vinylite rigid sheet material.

The majority of the computing instruments are produced from opaque black or white rigid vinyl sheets while protractors and other navigational plotting instruments are made of transparent sheets. The sheets are printed in one or more colors and then over-laminated with a thin transparent sheet of plastic to protect the inks. For applications where a drawing surface is required, a dull matte finish is obtained by means of a specially engraved planishing plate during the laminating process.

The instruments, illustrated here, were produced by G. Felsenthal and Sons. A number of additional applications for Vinylite rigid sheets are illustrated in their recent booklet, "Felsenthal Plastics, in War and in Industry."

Plastics in Future Aircraft Development

Both the structural and non-structural applications of plastics in aircraft have been constantly increasing, and plastics have come to be universally accepted and recognized not as just duration substitutes for critical materials, but as permanent replacements, superior in many applications to the products they replace. Plastics seem destined to play an increasingly important part in the future development of aircraft.

The creation of an entire bomber —the Mosquito—of resin-bonded molded plywood has been one of the outstanding developments of the war from all points of view—light weight, stability, great speed, an economy in both cost and the conservation of materials. The use of plywood for many parts in the construction of the plane—flooring, fuselage, paneling for sides, stabilizer and other parts—has eliminated 75% of the weight of the aluminum alloy formerly used. Plywood will probably be used to an even greater extent in the construction of future aircraft.

Most conspicuous among the improvements of design in aircraft is the use of crystal-clear transparent Plexiglas for aircraft enclosures, thus giving the pilot of a fighting plane and the whole crew of a bomber the wider range of vision that is so necessary for safety and efficiency. In many bombers, Plexiglas has been advantageously used for streamlined transparent noses, gun-turrets, observation windows, and tail empennage. At all these points, Plexiglas has brought a marked improvement in the plane, not only because of its optical properties, but also because it is only half as heavy as glass, and able to withstand exposure to sunlight, weathering, and high winds. Since Plexiglas can be formed into practically any shape, it fits smoothly into the contours of the plane and readily permits the mounting of machine guns in the nose and turrets. A new Plexiglas astrodome has been developed which permits the navigator to take octant readings while the plane is flying at full speed. Fuselages constructed almost entirely of Plexiglas have been developed for photography planes to provide a full, panoramic view. This plastic seems destined to become increasingly important in the design of future aircraft. The postwar family plane's cabin may be constructed almost entirely of Plexiglas to enable the flying commuter and pleasure flyer in the "old Jaloppy" to see everything that's going on around him—above and below, as well as in front and behind—to avoid collision with the neighbor's plane.

All-Plexiglas cockpit cover on Bell Aircobra is tailored to fit pilot snugly and give him full vision on all four sides. Top is hinged to permit pilot to enter and leave easily and quickly.

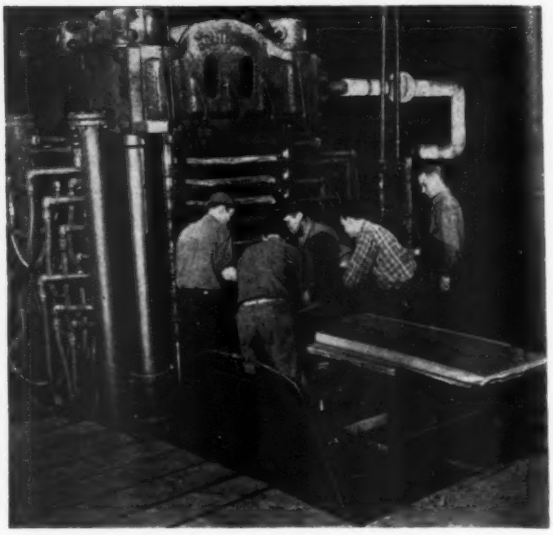
The adoption of many other plastics—for parts like fuel gages, knobs and handles, bearings, cable guards, hose lines, insulators, and many, many other essential pieces of equipment—offers another fine example of the greater economy and admittedly superior performance of plastics over the metals that were formerly considered indispensable for certain purposes. Molded polystyrene makes the stanchion for radio masts—laminated panels with fluorescent markings made of injection molded cellulose acetate—these are just two of the many uses of plastics in aircraft; other new and revolutionary uses are in the offing. This increase in the future use of plastics and plywood in the construction of aircraft will make the plane of tomorrow as cheap and as casually accepted and widely used as the automobile today.

When attacked by fighters, the bombardier of a North American B-25 turns gunner. With a rapid-fire machine gun mounted in one of the panels of his Plexiglas "greenhouse", his combat job is to fight off frontal attacks. The enclosure permits all-around vision, a valuable asset.

Laminated Plastics

1. Rolls of paper or fabric are impregnated as they pass through a bath of laminating varnish.—Solvent is evaporated in heated oven.
2. After impregnation, sheets are cut to size and stacked to predetermined thickness. Polished metal press plates are placed on top and bottom of each pack.
3. The photograph at right shows layers of sheets which are placed between heated platens of hydraulic presses.

Bakelite has recently published an illustrated booklet which describes laminating varnishes and manufactured plastic products. Further technical data and information on laminating plastics will be sent to those who are interested in this booklet.



Hydraulic laminating press. Layers of sheets impregnated with a Bakelite laminating varnish are placed between heated platens of the press.

Improvements in the Methyl Methacrylates

The widespread role of plastics in the war effort has done much toward accelerating the pace and widening the scope of plastics research. New plastics have been developed, and many have already made their appearance. Many of the "older plastics" too have been improved, in answer to war time needs.

One such improvement in the methyl methacrylate field has been the development of a molding powder capable of yielding molded articles that are appreciably more heat-resistant than any of the previously known molded methacrylates.

The methacrylates are an important member of the thermoplastic class of plastics. Their excellent transparency, good electrical properties, low specific gravity, and ease of molding have resulted in their use in many important war items, such as gas-mask lenses, airport-marker lenses, blackout lenses, medical instruments, water filters, etc.

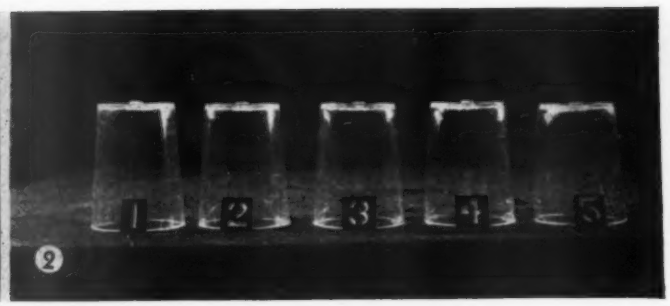
We classify a plastic as thermoplastic if an article molded from it can, upon application of heat and pressure, be softened and remolded to shape. The property of thermoplasticity carries with it its own compensations and its own problems. Ease of molding, adaptability to various molding methods, and the ability of being heat-softened for purposes of remolding constitute a few of the favorable aspects of the thermoplastic type of plastics.

A disadvantage of the thermoplastics, which minimizes their use in certain fields of application, is the fact that they are softened by heat. For this reason, much research effort has been devoted to improving the heat-resistance of the thermoplastics, and considerable progress has been made in this direction.

A recent improvement in the methyl methacrylates has been the increase in heat-resistance of the methacrylate molding powder compositions. After many months of research, a new methacrylate molding powder has been developed which will withstand service temperatures 30 to 40°F. higher than the service temperatures of articles molded from current commercially available methacrylate powders.

The material is available in two granulations, namely, a small-grained granular composition adaptable to compression molding because of its low bulk density, and the coarse-grained material adaptable to extrusion or injection molding conditions. The compression powder, coded HG-19, and the injection or extrusion powder, HM-19, can be used in your present injection, compression, or extrusion molding equipment, with no change other than the necessity of using a die or a cylinder temperature approximately 50°F. higher than would normally be used in the molding of the general purpose types of "Lucite," namely, formulas HM-102 and HM-113. It is forecast that the material will sell for the regular price. It can be molded on the same cycles normally used for the general purpose types of methacrylates, but the safe service temperature of the molded articles is from 30 to 40°F. higher than that of equivalent articles molded from the general purpose types of methacrylates.

It should be noted that the tendency of a molded article to be distorted by heat, and the temperature at which such distortion develops, are influenced not only by the characteristics of the material of which it is made, but also by the strains which have been developed in it by its previous treatment, and particularly by the technique and conditions under which it has been molded. Some consideration to bear in mind when attempting to develop the best heat-resistance characteristics of the molded articles are cylinder temperature, size and location of gate, and the thickness of the molded article.



Injection Molded Tumblers

Fig. 1 contrasts the effect of heat on tumblers injection-molded from the new heat-resistant HM-119 and the general purpose types of methyl methacrylate, HM-102 and HM-113. The tumblers were made in a single-cavity die with a center gate. The tumbler on the extreme left represents a HM-119 tumbler not subjected to heat. Proceeding to the right, the next tumbler shows the results of boiling a similar tumbler for 10 minutes. You will see that this tumbler has been only slightly affected, while the tumblers on the right, molded from HM-102 and HM-113, are badly distorted with considerable decrease in height and development of deep folds along their sides.

In passing it may be added that tumblers were used as an extreme illustration of a long-flow thin-walled article. It must be remembered that at the present time the acrylics are not available for this use.

Injection—Molded Tumblers—Protracted Dry Heat

Fig. 2 shows the resistance of HM-119 to protracted heat. Injection-molded HM-119 tumblers were exposed as follows:

Tumbler 1 is the unheated sample.

Tumbler 2 was heated for 10 minutes in a hot air oven at 212°F.

Tumbler 3 was heated for 30 minutes in the oven.

Tumbler 4 was heated for 60 minutes, and

Tumbler 5 was heated for 24 hours.

The reasonable retention of dimensional shape over a period of as long as 24 hours' continuous heating at 212°F. indicates the protracted resistance to elevated temperatures of the new molding composition.

The Gods of War Demand Plastics

AFTER ALL the surest prediction is change—new shortages develop from day to day, on account of the demand by our present war requirements. There was a time when fear was expressed that plastics would suffer a setback—those fears were groundless—our America will never tolerate disturbed conditions—despite the call of duty.

The present war conditions have called for unusual service by our producers. Plastics have responded in hundreds of important ways. The Government has already given evidence of this, as our previous illustrations confirm—"The Gods of War" have demanded and plastics have answered the call magnificently.

Today, designers of plastics must be engineering specialists. They must know how world conditions influence availability of materials. They must know the structural and protective values of those available materials and be competent to cope with the problems of this day and age. The world's pessimistic attitude towards plastics underwent a momentous change since the beginning of this war. This great producing nation is in it up to the hilt with an unanimous determination to win—and she will—backed by America's great inventive power.

The flight from tin and various other materials has not reached its peak. Forecast of what may be expected is shown by the phenomenal rush to plastics.

We have a wealth of new substances and technologies. Some were flowering before the war and many have been perfected under war pressures. A great number of plastics are as transparent as glass, in fact more so. It is possible they will be made as hard as glass. If so, which is very possible, and providing they could be made as cheaply, a terrific competition would exist. Many of them are as hard, though, and also it is a safe bet they will be coming down in price. It is also true that plastics can be sawed and bored like wood, and formed in mild heat.

The largest market will probably be in aircraft. Others say automobiles, furniture, lighting fixtures, machinery, tools, and various other instruments important to American industry. However the main challenge to industry of the future lies in the great expansion of styrene plants for raw materials. It is generally known that styrene plastics are made by Bakelite Corporation, and we have been told when the war is over we shall see them in transparent parts of automobiles and gas and electrical refrigerators. Their high insulating quality adapted them to places in high frequency radio and television equipment. They will fill many other requirements, so says war pressure.

Cellulose compounds, which may be transparent or not, are made by Celanese Celluloid and seven other major producers. Clear sheets are employed for inclosures in aircraft and still are used in trainer planes, but the newer acrylics took the play in the larger ships. Plastics holds the world record for its brilliant performance and achievements. The recent expansion of these products of organic chemistry has been as rapid in some of their departments as the expansion of aluminum. Together the annual bulk of plastics (but not their weight) exceeds copper.

The Advent of Injection Molding

THE ADVENT of injection molding of thermoplastics has brought to the fore development of a method for continuous production of thermosetting plastics by the injection-molding principle. Today, this method of molding thermosetting materials by injection is a reality. Leaders in the plastics molding industry, and many large users of molded plastics who have long and ardently sought means of adopting this swift, efficient process of injection molding thermosetting materials now have available this new process, adaptable to present, hard-to-obtain, standard injection-type presses.

Jet Molding—The Answer To Many Hopes

The new Jet Molding Process appears to be the answer. This process permits high-speed production with thermosetting, as well as thermoplastic materials, using standard injection machines converted for jet molding. Conversion units consist essentially of a special heater with temperature indicator and control, and a feed cylinder and plunger. The basic principle lies in the fact that with this process all heat required for polymerization is applied to the material prior to injection. The nozzle of the unit is continuously water-cooled. During the same instant that pressure is first applied to the plunger, extreme heat is briefly generated in the nozzle. Thoroughly plasticized by this heat, the thermosetting material flows freely, in a thin, highly fluid stream, into the heated mold where it sets quickly.

Because the nozzle is cooled immediately after being flash-heated, and the injection stroke is completed, the material in the nozzle does not set up, but remains highly plasticized, awaiting the next heat-wave and injection. Thus, a constant supply of free-flowing material is maintained for fast, uninterrupted production.

Due, apparently, to the high fluidity of the molding material at the instant of injection, jet-molded parts are extremely dense, free from porosity, seemingly toughened by the high temperature employed. Intricate parts, with numerous delicate inserts, thin sections, and close tolerances, are molded easily and rapidly with minimum rejects. Moreover, tests of molded parts produced by the jet process indicate properties superior to those of standard compression-molded pieces. Each section, thick or thin, exhibits full-rated strength. Uniform quality, as well as great speed, is an outstanding production feature.

A Revelation In Molding Progress

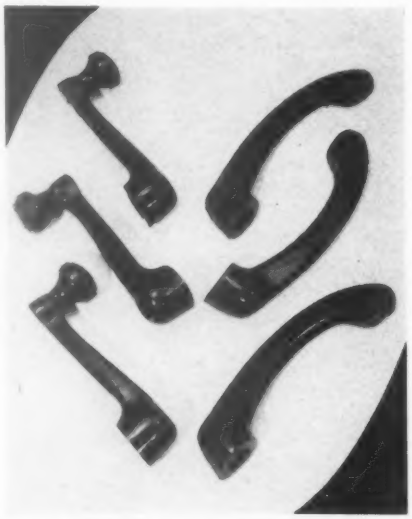
To one seeing for the first time parts being molded of thermosetting materials by the jet molding process, the results obtained are nothing short of a revelation. All types of molding compounds of the heat-setting type, characterized by various degrees of bulk factor and plasticity, are fed into the machine through proper hopper mechanism, and are molded with immediately apparent gains in quality and ease, speed and overall economy. Standard A. S. T. M. mechanical, electrical, thermal, and chemical tests show improved properties.

The primary reason for these better results is that this method of molding produces optimum plastic softness in the material, enabling it to flow properly under minimum pressure, filling the mold in minimum time and without porosity. Therein is the basic principle of efficiently molding thermosetting plastic compounds; co-ordination of temperature, pressure and time to obtain optimum plasticity in the initial softening period, which may vary from bare mobility to relatively high fluidity.

The adjoining figures illustrate a typical injection-molding nozzle principle used for thermoplastic materials. The jet-molding nozzle principle of the conversion units is adaptable to standard fully automatic injection-molding machines. Jet molding of thermosetting materials eliminates the mass-heating of a given mold charge, as in compression molding. The charge by the jet-molding principle, as applied with a standard thermoplastic injection-molding machine, is placed in a hopper and is gravity-fed through a chute into a feed cylinder sleeve. (A) Standard powder materials, grains, chips, flakes, or other convenient forms of material may be fed into the cylinder.

The material is moved forward by a plunger (B) which is provided with an internal aperture to insure cooling of the plunger face, which prevents the granules from softening at this point and creeping around and building up on the sides of the plunger.

The material is thus moved through an effective heating zone where a controlled temperature of 150 to 190 deg. F. exists (C). Continued pressure exerted by the ram causes the heated charge to flow. No detrimental reaction takes place in the cylinder because the temperature maintained at that point is too low to permit any heat-softening and subsequent heat-hardening.

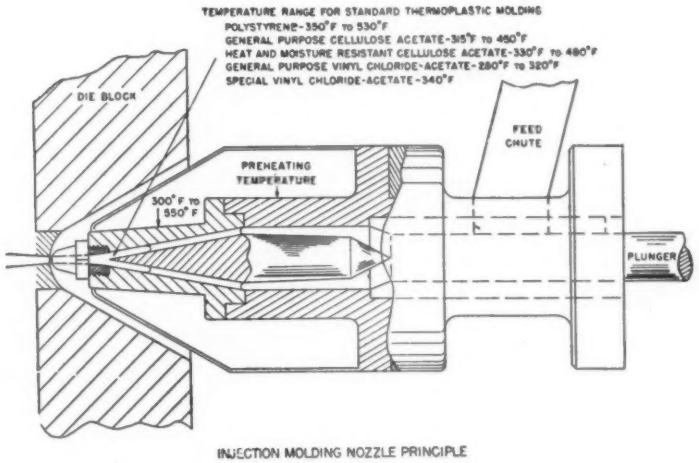


Who cares if chromium hardware is taboo for the duration? Here are khaki color LUMARITH plastic handles that not only look handsome, but have many advantages over the metal they release. Lumarith is not bothered by any of the corrosion problems that confront metal . . . it will not chip or warp . . . and it is light in weight yet strong. Changes in temperature or humidity will not impair its surface, and a damp cloth is all that's necessary to keep the handles gleaming.

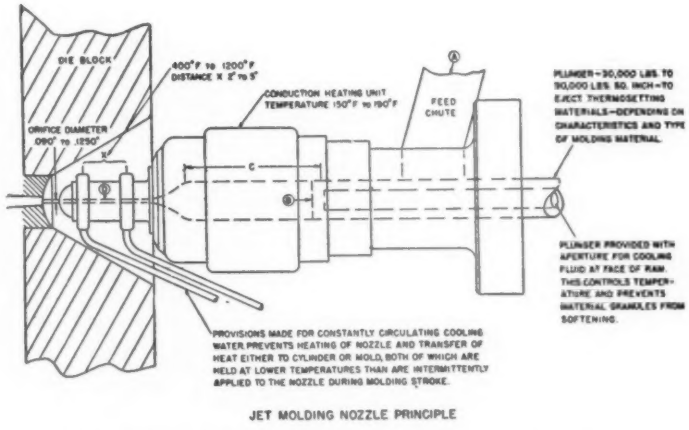
Lumarith will not fade because its special formula renders it impervious to ultra violet rays — an advantage invaluable when handles are once again produced in peacetime colors harmonizing with upholstery.

Molded over cores of metal (for extra strength) these Chevrolet door and window handles need very little finishing after they emerge from the mold smooth and perfectly formed.

Molded by Mack Molding Co. of Wayne, N. J. Lumarith* is a product of Celanese Celluloid Corporation, a division of Celanese Corporation of America. *Reg. U. S. Pat. Off.



Typical injection-molding nozzle principle used for thermoplastic materials.


DIE BLOCK
400°F to 1200°F
DISTANCE X 2" to 5"
CONDUCTION HEATING UNIT
TEMPERATURE 150°F to 190°F
FEED CHUTE
ORIFICE DIAMETER
.090" to .1250"
PLUNGER-30,000 LBS. TO 90,000 LBS. SQ. INCH-TO EJECT THERMOSETTING MATERIALS-DEPENDING ON CHARACTERISTICS AND TYPE OF MOLDING MATERIAL.
PLUNGER PROVIDED WITH APERTURE FOR COOLING FLUID AT FACE OF RAM. THIS CONTROLS TEMPERATURE AND PREVENTS MATERIAL GRANULES FROM SOFTENING.
PROVISIONS MADE FOR CONSTANTLY CIRCULATING COOLING WATER PREVENTS HEATING OF NOZZLE AND TRANSFER OF HEAT EITHER TO CYLINDER OR MOLD, BOTH OF WHICH ARE HELD AT LOWER TEMPERATURES THAN ARE INTERMITTENTLY APPLIED TO THE NOZZLE DURING MOLDING STROKE.
JET MOLDING NOZZLE PRINCIPLE

Jet-molding nozzle principle of conversion unit adaptable to standard fully automatic molding machines.

As the ram continues its forward movement against the softening charge at the end of the cylinder, the charge is forced into the ejection nozzle (D) which is heated while ejection is in progress to a temperature which may be anywhere between 400 and 1,200 deg. F. according to need. The temperature is controlled carefully in accordance with requirements, depending upon the composition of the plastic being worked, the amount and nature of the filler it contains, if any, the size and complexity of the mold, and other factors. The charge is ejected in a fine stream.

The charge receives heat in the nozzle just before and during its injection, a period of momentary duration. Its velocity is such that the charge does not, however, attain a temperature equal to that of the nozzle at the instant of ejection. Possibly, circulating cooling water, flowing through the heating tips, prevents transfer of heat from the nozzle to the cylinder, or the mold, both of which are held at lower temperatures than those intimately applied to the nozzle. This cooling also enables the material to be solidified to the nozzle channel, if and when desired. It is believed that such solidification is without polymerization; but, whatever the explanation may be, in practice the material can again be made to flow under heat and pressure after being held so solidified in the nozzle for several hours.

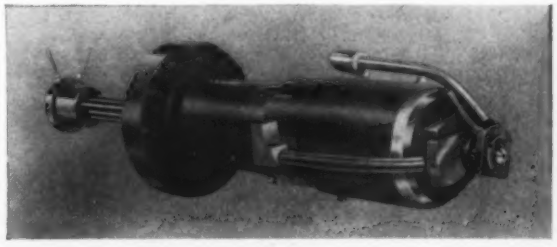
The temperatures maintained in the mold are also controlled in consonance with factors similar to these which determine the temperature to be used in the nozzle. Normally, the mold temperatures will be in the order of 300 to 325 deg. F., although for certain types of work temperatures of 400 deg. F. or more may be employed. This temperature is not critical, as with jet molding it has been found practical to run the mold somewhat hotter than necessary without injuring the material.

The time of injection, or plunger speed in inches per minute is determined by the same factors as govern the nozzle temperature, and include quantity of material ejected in each shot, the characteristics of the material, flow distance, etc. Definite electric controls for speed of the ejecting stroke and for heating the nozzle are coordinated both as to heating elements and as to plunger travel.

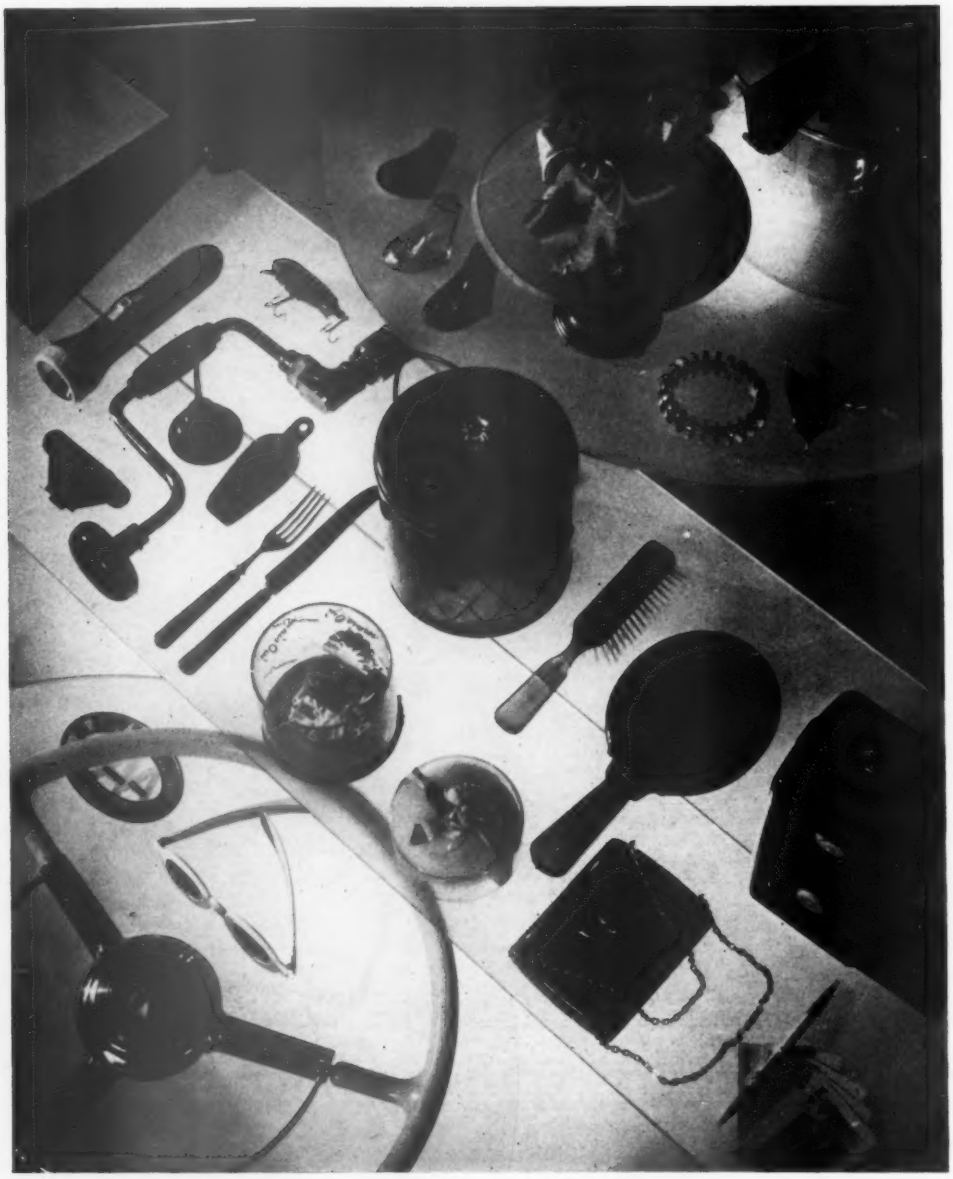
The heating elements are of the induction type, such as are used in resistance spot-welding apparatus. With this type of heating, instantaneous and high temperatures can be generated on the nozzle so that the nozzle passages will be heated to a temperature which will practically liquefy the molding material as it is ejected through the passage in a very thin, fast-moving stream. The temperature to which the material is subjected is much higher than it could withstand for any substantial period, but, since it is subjected to this intense heat for only a fraction of a second, no harmful effects occur.

The Jet-Molding Process may be applied to any standard injection-molding machine, and will handle both thermosetting and thermoplastic materials, including natural and synthetic rubbers.

In molding heat-setting materials, the various types of phenolic compounds can be worked to good advantage, including the fabric and paper-filled materials of the stronger impact types; also, the many colored, translucent, and pastel ureas, and melamines. Thus, by adaptation through this process, the injection machines become a universal molding combination, permitting high-speed production by continuous injection molding.



Conversion unit for jet molding, developed by Plastic Processes, Inc.



Above is a group of a few of the many miscellaneous products made from plastics.

Low Temperature Plastic Fits Exacting Industrial Uses

THE ACCELERATED pace of fast-traveling plastics is continuously carrying these useful materials into new and more difficult fields. Typical of such developments is a test journal box cover molded from Ethocel—designed to replace cast iron.

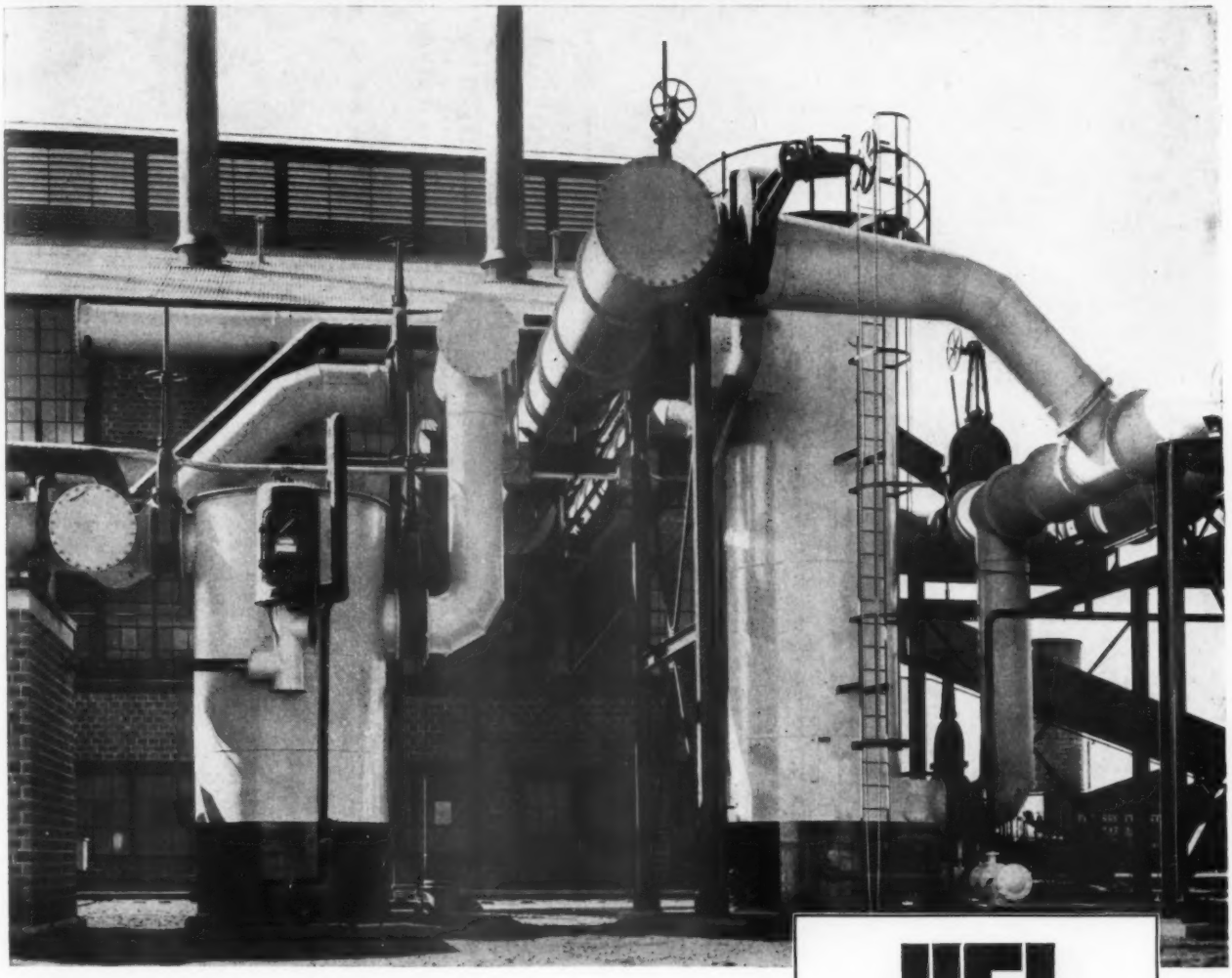
Ethocel is tough and durable—yet sufficiently flexible to permit the cover to "spring" into position, completely sealing the opening. Rain, dust, dirt and snow are kept out of the box that houses the axle bearings; oil is kept in. Test runs show that "hot boxes" caused by lubrication failure are thus controlled—helping to maintain train schedules.

To meet such industrial requirements of toughness and shock resistance at extremely low temperatures, Dow has recently developed a new Ethylcellulose formulation designated as LT Ethocel. It is designed for lightness and strength and has many times the impact strength of average thermoplastic molding compounds at sub-zero temperatures. These factors make the new formulation ideal for a journal box cover and comparable difficult industrial and military applications.

Extruded Piping

Extruded Plastics, Inc., Norwalk, Connecticut, are the makers of "Tulox" TT seamless plastic tubing,—now available in all diameters up to 2½" O.D., to meet requirements of war production. Extruded from Tennessee Eastman Cellulose Acetate butyrate.

USE "UNITED ENGINEERS" FOR PLANT EXPANSION



UNITED ENGINEERS provides you with an organization experienced in all of the problems of present day construction to design, construct and place into operation the facilities necessary for gas plant expansion.

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EXPERIENCE IN DESIGN
United has over 50 years experience in gas plant design.

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UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK PHILADELPHIA CHICAGO

At "Battle Stations" with the Navy

Official U.S. Navy Photo

This Naval Insignia is the officer's cap device, worn by all ranks from flag through chief warrant officers, in both metal and embroidered styles. It shows the new position of the eagle, facing right. The eagle was changed in May 1941 so it now faces the wearer's sword arm, the heraldic position of honor.

AT home ports and advanced bases, on floating dry docks, and in the naval yards—wherever the ships of our Fleet are built, repaired or fueled, dependable Dresser Couplings and Repair Devices are on the job.

In war, as in peace, these pre-fabricated, quickly-installed pipeline products are joining the multitude of oil, water and gasoline lines needed at every base. Dressers, too, are used extensively for marine piping, for bulkhead seals and other naval applications.

Today Dresser is making more couplings, fittings, clamps and sleeves than ever before. These pipeline products are available in practically all sizes and quantities under proper ratings. Write for catalog, "How to Join and Repair Pipe."

Dresser Manufacturing Co., Bradford, Pa.

DRESSER

Pipe Couplings, Repair Devices, Rings, Wheels, and Forgings for War

Silicon Carbide Linings In Water Gas Generators

By
Theodore F. Papen
Production Superintendent
Worcester Gas Light Co.
Worcester, Mass.

IT IS EXTREMELY doubtful whether the Framingham Division of the Worcester Gas Light Company could have continuously supplied gas to its customers through the peak periods of operation during this war had not the Framingham generator been lined with silicon carbide brick.

We have had four years experience with silicon carbide linings in our Framingham and Worcester plants. The reasons for installing this superrefractory brick, together with the results obtained are discussed in the following paragraphs.

In 1939 we had at our Framingham plant a nine-foot water gas set (using heavy oil, 100% in the generator) which produced 110,000 cubic feet of gas per hour. This was insufficient to take care of the load at Framingham during the fall, winter, and spring, and it was necessary to supplement this supply with gas from our Worcester plant during nine months of the year. However, a lack of line capacity made it impossible to transfer sufficient gas from Worcester to Framingham to take care of the Framingham requirements had that generator failed due to trouble with the lining. If we had had a failure in the generator lining at the Framingham plant it would have been necessary to remove this set from service and depend entirely on gas from Worcester to carry the load. The greatest amount of gas which could be transferred from Worcester to Framingham in 24 hours was 1,200,000 cubic feet, not nearly enough to meet the demand there.

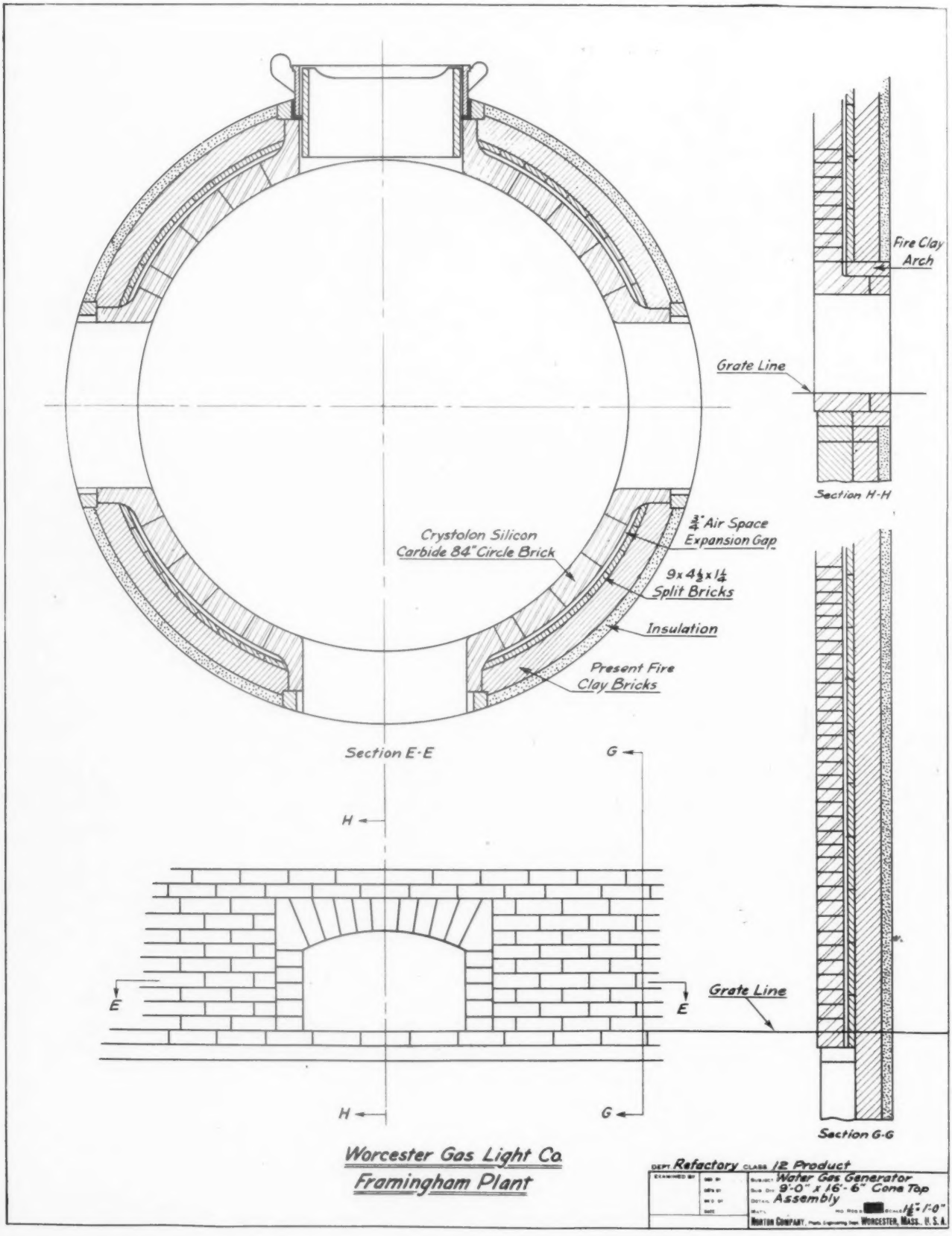
Therefore, we decided to select a refractory material which would guarantee a long lining life in the generator and give us assurance of going through a fall, winter, and spring season without any shutdowns for replacing or repairing the lining. This had never been possible with a fire clay lining.

Design of Lining

In co-operation with Norton Company, a "Crystolon" (silicon carbide) lining was installed. It was complete from the grate bars up to the key brick which support the dome lining in a cone top set. The silicon carbide brick were installed to this height so there would be a solid lining surface which clinkers would not penetrate. By this we planned to overcome the ill effects of clinkering found when operating with various fuels and varying amounts of oil in the generators.

An important feature of the design and installation of the silicon carbide lining was the annular air space left between the silicon carbide brick and the insulating brick set against the outer shell. For insulation, the original backing-up material was supplemented with 1¼" split fire clay brick laid broadside and on end. An annular air space of ¾" was left between these split brick and the 4½" wide silicon carbide circle brick. This

This interior view of Gas Generator shows Crystolon Doors and Circle Brick.


Fire Clay Arch
Grate Line
Section H-H
Crystolon Silicon Carbide 84" Circle Brick
¾" Air Space Expansion Gap
9 x 4½ x 1¼ Split Bricks
Insulation
Present Fire Clay Bricks
Section E-E
G
H
E
E
H
G
Grate Line
Section G-G
Worcester Gas Light Co.
Framingham Plant
DEPT. Refactory CLASS 12 Product
Water Gas Generator
9'-0" x 16'-6" Cone Top
Assembly
1/2" = 1'-0"
NORTON COMPANY, WORCESTER, MASS., U. S. A.

annular space very successfully allowed for the growth and expansion of the silicon carbide brick. The expansion area was sealed every five courses of brick with a rope made of fire clay and ground brick. This was done to avoid any by-passing of air, gas, or steam. Subsequently, we were never able to find any evidence of by-passing and this blocking was omitted from later installations.

This set was removed from the line to repair valves and piping during July of each year. The longest period for such repairs was three weeks in July 1940, and the shortest period 10 days in July 1941.

Long Service

When the set was pulled down for these repairs, the lining was examined and only minor cracks were found in the brick work. There was no evidence of disintegration due to the action of steam, oil, or clinker adherence. The cracks were smoothed over with a refractory cement and the set put back into operation. (After 19,000 hours of service the silicon carbide brick had to be replaced around the cleaning doors, because the constant action of breaking up and removing clinkers had fractured those brick framing the doors.)

Since that time we have made two installations of silicon carbide linings at our Worcester plant in 11-foot sets. Our experience here has been as satisfactory as at Framingham.

Lining Details

The estimated installation cost was increased somewhat, because it was considered advisable to build independent arches over the cleaning doors, in order to support the outer backing-up lining. The design of the silicon carbide lining was such that the block framing the doors extended from the inner surface of the lining to within 2″ of the shell. This 2″ space was filled in with insulating brick. By using the independent arch supporting the backing-up lining, replacement of the silicon carbide doors was greatly simplified.

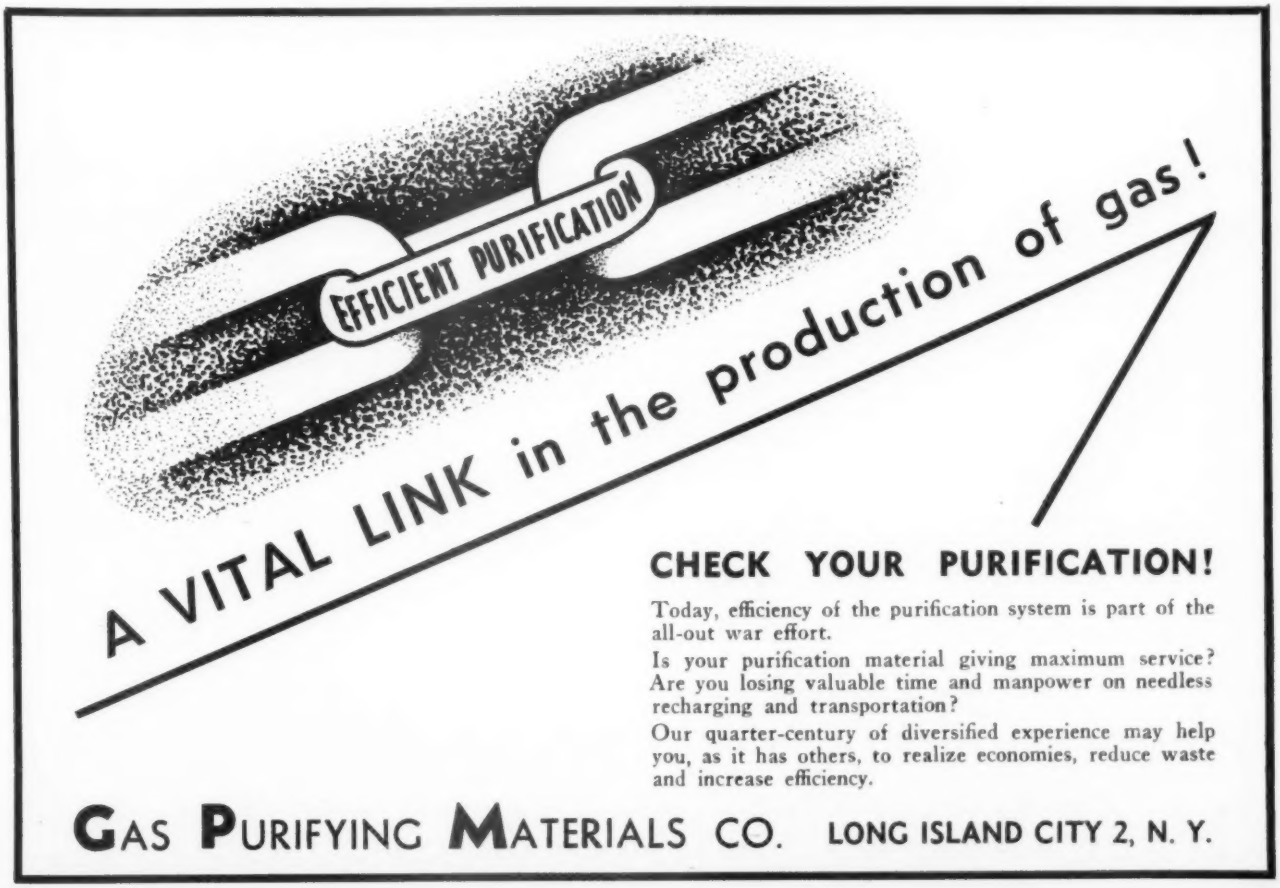
Shut-downs Obviated

Although silicon carbide brick have a higher initial cost than do ordinary fire clay brick, we are satisfied that the installations of super-refractory linings have fully paid for themselves by guaranteeing continuous operation of the sets through high demand period with no danger of shut-downs due to failure of the lining.

With fire clay linings used previous to the installation of silicon carbide, a set was shut down for one month during the summer to either repair or replace the lining and was again shut down for one week in the fall, and often for periodic emergency shut-downs lasting one or two days during the winter.

We are not prepared to show figures giving a direct comparison of cleaning costs, but we believe that cleaning time for a gang of six men has been reduced 1½ hours per day. This saving by itself would pay for a silicon carbide lining during the course of one year's operation.

The service given by the silicon carbide brick in the set at our Framingham plant is certainly satisfactory. The lining installation was completed in July 1939 and the brick are still in service after 22,362 hours of actual gas-making time up to September 1 of this year, and we expect to operate this set through the coming winter.


EFFICIENT PURIFICATION
A VITAL LINK in the production of gas!
CHECK YOUR PURIFICATION!
Today, efficiency of the purification system is part of the all-out war effort.
Is your purification material giving maximum service? Are you losing valuable time and manpower on needless recharging and transportation?
Our quarter-century of diversified experience may help you, as it has others, to realize economies, reduce waste and increase efficiency.
GAS PURIFYING MATERIALS CO. LONG ISLAND CITY 2, N. Y.

Operating Wrinkles

By
W. F. Schaphorst, M.E.
Newark, N. J.

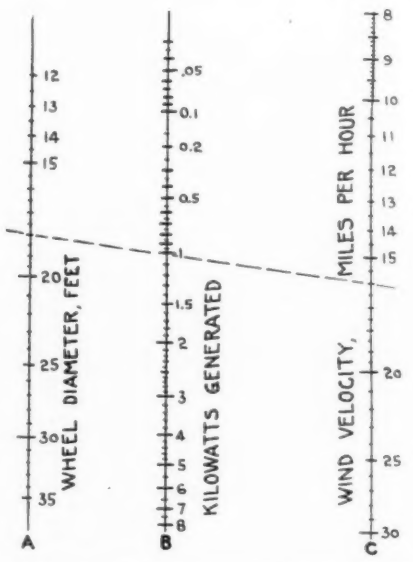
How to Estimate the Power of a Windmill

Let us say that in your vicinity the average wind velocity is 16 miles per hour. You have decided that you want to operate a one-kilowatt electric outfit. What must be the diameter of the windmill wheel?

This chart will "figure it out" for you. Simply run a straight line through the 16 in column C and through the 1 in column B and the intersection with column A shows that a wheel 18 ft. in diameter will produce the needed power.

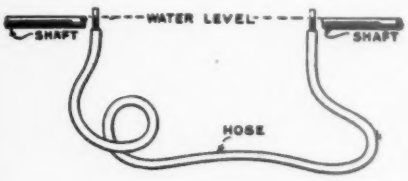
This chart is based on actual data of windmill performance and is not "theoretical." It is practical. Thanks to the airplane and recent intensified studies of air mechanics we are learning how to build windmills that are more efficient than they once were. It is therefore quite possible that you can "beat" the figures given in this chart by using a truly up-to-date windmill. However, it is better to give figures that are "safe" rather than those that might be attained with difficulty.

To convert kilowatts to horsepower, multiply by 1.34. In other words, the above windmill 18 ft. in diameter will produce 1.34 hp. when the wind velocity is 16 miles per hour. It will be observed by using the chart that to double the power of the above mill it is not necessary to double the velocity of the wind. 28 miles per hour will give you 2 kw., or 2.68 horse power.



How to Do Any Leveling Job With a Hose Full of Water

Slip gauge glasses into each end of an ordinary garden hose as indicated in this sketch, and fill with enough water so that the level will show in each glass. You are ready for any leveling job, and you can do it with the utmost accuracy. In the sketch a shaft is shown as an example, but the method is applicable to almost any leveling job.

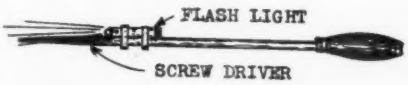


When filling the hose with water, make sure that all air is gotten out of it. Hold it in a U-position when filling, if possible. Do not attempt to fill it by immersing the hose in a tub of water. Also, one end of the hose must not be warmer than the other end when leveling. If the water at one end is warmer it will be lighter in weight and the level will not be true. In other words, get rid of all air and use water of the same temperature throughout the full length of the hose.

Now I Can Insert Screws in the Dark

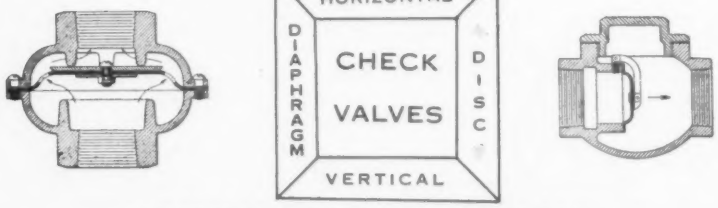
Here is a handy kink for use in the daytime as well as at night. Many a time I have had difficulty in "seeing the slot" in the head of a screw and have been obliged to grope and feel around for it.

Flash lamps are now made in such extremely small sizes that I hit upon the idea of fastening a flash lamp to the shank of a screwdriver as indicated in the sketch. The light accomplishes its purpose very well. With this arrangement I can now plainly see the screw slot at any time—night or day.



Some time ago I did the same thing with an oil can, fastening the flash lamp in such a position that it lighted the end of the spout. I found it to be a great time and oil saver, but it did not occur to me at the time that the same idea could be applied so admirably to a screwdriver.

Prompt Deliveries From Our Own Factory



NORWALK VALVE COMPANY
85 Spring St. South Norwalk, Conn.

BUY WAR BONDS
ON SALE AT YOUR GAS COMPANY OFFICE

Over 22,000 Hours of Gas-Making Time with Norton Silicon Carbide Linings

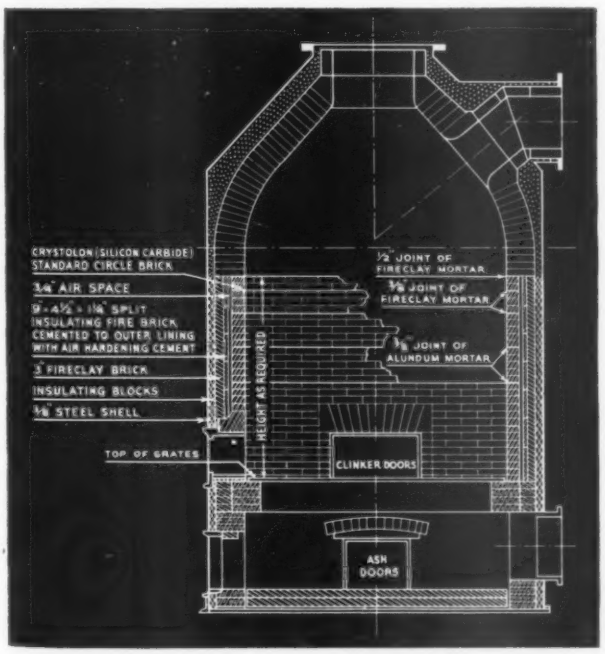
War has presented operators of water gas plants with the problem of obtaining maximum gas production from the generators with a minimum of "downtime" for repairs, cleaning and other maintenance.

Norton CRYSTOLON (silicon carbide) brick are helping solve this problem in three ways: (1) by guaranteeing long lining life; (2) by increasing plant production; (3) by eliminating shut-downs for lining repairs.

CRYSTOLON brick, in one plant, have been in continuous service for over 22,000 hours of actual gas-making time. The long life of these brick largely results from the dense refractory surface which resists slag penetration. When the clinker ring is broken away from the wall, the brick remain unaffected.

The resistance of CRYSTOLON brick to slag penetration has greatly shortened the time for clinkering and properly cleaning the fire in many plants. (Officials of one company estimate that a CRYSTOLON lining saves them from six to nine man-hours per day in cleaning time alone.) Plants which have lost younger, skilled men to the armed forces and which are consequently experiencing a man-power shortage will appreciate the simplified clinkering and cleaning which CRYSTOLON linings make possible. A further benefit results because the set is open only briefly and has less time to cool, with a subsequent saving of coke and of time required to bring it back up to production temperatures.

Interior View of Gas Generator showing Crystolon Doors and Circle Brick


CRYSTOLON (SILICON CARBIDE) STANDARD CIRCLE BRICK
3/4" AIR SPACE
9" - 4½" - 1¼" SPLIT INSULATING FIRE BRICK CEMENTED TO OUTER LINING WITH AIR HARDENING CEMENT
3" FIRECLAY BRICK
INSULATING BLOCKS
3/16" STEEL SHELL
TOP OF GRATES
HEIGHT AS REQUIRED
½" JOINT OF FIRE CLAY MORTAR
⅜" JOINT OF FIRECLAY MORTAR
⅜" JOINT OF ALUNDUM MORTAR
CLINKER DOORS
ASH DOORS

Sectional Drawing of Gas Generator Lined with Crystolon Refractory Shapes

CRYSTOLON brick will eliminate repairs by reducing the necessity of localized patching and the danger of burning through into the backing-up brick.

The results which may be expected from a CRYSTOLON lining, of course, will vary depending on conditions of operation. The more continuous the operation the greater will be the expectant life of these super refractory brick. CRYSTOLON brick linings have the best opportunity to demonstrate their value where service is severe.

NORTON COMPANY

Worcester **Massachusetts**

Purification COSTS LESS THIS WAY

LAVINO "ACTIVATED" OXIDES

LAVINO ACTIVATED OXIDE is supplied in unmixed form . . . ready for mixing with your own carrier . . . and is adaptable readily to the needs of your plant, whatever its size or requirements.

Not merely a "satisfactory" purifying medium by virtue of incidental properties, **LAVINO ACTIVATED OXIDE** is a material made specifically for maximum H_2S removal. As such, its practical capacity and activity are controlled factors. And, it offers maximum activity for trace removal and maximum shock resistance.

GREATER ACTIVITY . . . .
GREATER CAPACITY . . . .
FAR MORE H_2S REMOVAL
PER POUND OF OXIDE

Contains 75% Fe_2O_3 as received; approximately 10% moisture.

LAVINO ACTIVATED SPONGE is available also for the same fine service that distinguishes the **ACTIVATED OXIDE.** It is furnished ready-mixed, carefully coated on large, tough, specially selected hardwood shavings.

Both are made in the United States . . . Both are disinfected by a special LAVINO process to minimize the formation of mold, or other fungus growth.

E. J. LAVINO AND COMPANY

1528 Walnut St., Philadelphia 2, Pa.

Efficient Operation of Small Water Gas Machines

Part 1

By
S. F. McCallister
The Twin State Gas & Electric Co.
Brattleboro, Vermont

WHILE IT IS ALWAYS desirable to operate water gas machines at the highest possible efficiency, the war situation makes it even more so at this time. Fuels and oil are higher in price, deliveries sometimes uncertain, and quality frequently not up to previous standards. In addition every pound of generator and boiler fuel and every gallon of oil saved is that much load taken from the country's transportation system.

In the larger plants there is usually someone whose sole duty is to maintain fuel and oil efficiencies; but in the small plant the results are largely up to the gas maker. That he have a clear understanding of the process is exceedingly important.

Much of the operating in the small plant is done by rule of thumb; and it must be admitted that results obtained by practical men who are on the job and have learned by long experience what to expect from the machine, are frequently very good.

It is the purpose of this article to review some of the technical aspects of water gas manufacture, with the idea in mind that such information may be of value to the small plant operator, who perhaps, may not have too clear an idea as to causes and results. It is simply an attempt to set down in logical order, and in one place, some well known facts regarding water gas manufacture and manufacturing efficiencies. No claim is made that the material is new or original.

In securing maximum efficiency from the operation of a water gas machine there are fundamentally two problems: (1) Maintaining the highest efficiency in blasting, and (2) obtaining highest efficiency in the actual gas making.

Efficiency in blasting means losing as little as possible of the heat developed by the combustion of the generator fuel during the blow. Efficiency in gas making is somewhat more complicated for it must take into consideration the quality of the blue gas produced and the amount of heat which must be stored up during the blow to produce it. While the amount of heat required for the chemical reactions which produce blue gas and the heat losses in connection with its production are not related to the efficiency of blasting, they do affect the amount of generator fuel which must be used to develop that heat during the blow, and thus the overall efficiency.

In like manner, the efficiency with which oil is used in gas making is somewhat affected by the amount of heat which must be developed during the blow in order to heat the checker brick to the proper temperature for oil cracking, since this will also affect the amount of generator fuel used. Strictly speaking, however, the oil efficiency is a separate matter and is the relationship of the Btu in the oil used to that in the oil gas made.

The Blast

It is necessary for the best oil efficiency, that the average temperature of the checker brick be held at some point which has been found to be correct for the quantity and quality of oil used. At the same time efficiency in the use of generator fuel demands that no notable amount of unburned gases should be allowed to leave the set during the blowing period, and that excess carburetor air be held to an absolute minimum. In other words, the set should be so operated that just enough heat is sent to the checker brick to maintain proper oil cracking temperature and the balance retained in the generator. If this aim is accomplished, blasting efficiency will be high.

In order to maintain this nice balance, the operator should be thoroughly familiar with the action which takes place in the generator during the blow. It must be understood that any heat put into the checker chambers must come from the generator. Heat is liberated in the checker chambers by the combustion of gases (principally carbon monoxide (CO) which come from the generator, and the amount of these gases is under control by following certain principles.

The Action of the Generator Blast

To obtain a clear understanding of the mechanism of the blow, it might be well for us to consider the chemical action which takes place in the fuel bed during that period.

Starting at the grates, we come first to a layer of clinker and ash, which is chemically inactive. However, its temperature is somewhat higher than that of the blast air; and there is therefore some transfer of heat, which raises the temperature of the air slightly. That is the only action in the clinker zone.

Next the blast air comes in contact with the bottom part of the hot fuel. This is the most active part of the fire; and vigorous chemical action, known as combustion, takes place with the evolution of large quantities of heat. The carbon in the fuel combines with the oxygen in the air; and according to present accepted theory, an indefinite and unstable compound C_xO_y is initially formed. This breaks down into carbon dioxide (CO_2) and carbon monoxide (CO) in proportions tending to come to equilibrium on the basis of temperature, pressure and the relative masses of carbon and oxygen present.

The speed of travel of the products of combustion through the fire prevents equilibrium from ever actually being reached; and since excess oxygen is present in the early stages of the combustion, the less the time of contact, the less opportunity there will be to collect all of the carbon the equilibrium would permit. In other words, the shorter the time of contact the greater the proportion of carbon dioxide (CO_2) and the less

Five by four Water Gas Set From Clinker Floor.

the proportion of carbon monoxide (CO).

While not strictly in accordance with modern theory, we will not be far wrong from a practical standpoint if we think of the lower active part of the generator fire as an oxidizing zone, where the fuel is burned to carbon dioxide (CO_2) with the evolution of a large amount of heat. Above that we may consider that there is a thin neutral zone. Still further up we may assume another zone of chemical action, which we will call the reducing zone, where there is no oxygen present but where the fuel has been raised to a high temperature by the heat of combustion below. Here a part of the carbon dioxide (CO_2) may be considered as picking up additional carbon from the fuel to form carbon monoxide (CO). The carbon monoxide (CO) thus formed is the fuel that is used to heat the carburetor and superheater, including the checker brick, by burning it with additional (secondary) air.

Going higher in the reduction zone the temperature of the fuel bed gradually decreases. At some point it becomes lower than that required for the chemical reactions of combustion. From this point to the top of the fire there is another zone of gradually decreasing temperature, known as the distillation zone. In this zone the fresh fuel is being heated by the hot gasses passing through it. Any volatile matter in it is usually driven off here and is added to the gases going to the carburetor. With coke fuel the amount of this volatile matter is so small that we can neglect it entirely for the purposes of this discussion. However, when bituminous coal is used for generator fuel it becomes a considerable factor, and makes necessary certain changes in the operation of the machine. To avoid complication we shall consider that coke is the fuel for the balance of this article.

Distribution of Heat in the Set

Since combustion is most intense in the lower part of the fuel bed, most of the heat that is available in the fuel burned is liberated there. A major part of this heat goes into raising the temperature of the fuel bed and the linings of the generator, but some of it is carried out of the generator by the blast gases and another part is lost by radiation from the shell. If all of the combustion were to carbon dioxide (CO_2), most of the heat developed would remain in the generator stored in the fuel bed and linings.

But combustion to carbon dioxide (CO_2) liberates far more heat than combustion to carbon monoxide. For every pound of carbon burned to carbon dioxide (CO_2) 14,092 Btu will be liberated, but if the same amount of carbon is burned to carbon monoxide (CO) only 3,958 Btu will be liberated. The remaining 10,134 Btu will be obtained when the carbon monoxide (CO) is burned to carbon dioxide (CO_2); and in a water gas set, this is done in the carburetor.

Here then is our clue to the control of the amount of heat sent to the carburetor. By increasing or decreasing the amount of carbon monoxide (CO) in the blast gases from the generator we can distribute the heat of the fuel between the generator and the carburetor and superheater in any proportion that we desire. It is also obvious that any carbon monoxide (CO) that escapes from the stack unburned is a loss of generator fuel.

The amount of heat that will be necessary to properly heat the carburetor and superheater will depend, to a large extent, on the heating value of the gas to be made. With a high Btu gas more of the finished gas will have to consist of oil gas. Therefore more oil must be used per MCF made and a greater proportion of the heat developed must go to the carburetor and superheater to store up enough heat so that the oil may be properly gasified.

Control of Heat Distribution in Set

The proportion of the total heat developed that goes to the checkers depends therefore on the average percentage of carbon monoxide (CO) in the generator gases. This in turn depends on four principal factors:

(1) Temperature of the fuel bed
(2) The depth of the fuel bed
(3) The reacting surface of the fuel
(4) The rate of blasting.
(In a water gas set usual variations in pressure are insufficient to affect carbon monoxide (CO) production appreciably.)

In practice, the hotter the fire, the deeper the fire and the greater the reacting surface in the fuel bed, the *higher* the carbon monoxide (CO) content of the generator gases. But the higher the blasting rate, the *lower* the carbon monoxide (CO) in the generator gases.

By temperature of the fuel bed we of course, refer to the average temperature. The actual temperature will be different in different parts of the fuel bed and will vary widely during the course of the blow and run.

While theoretically the rate of generator air input, as controlling the length of time the air will be in contact with the fuel, is a factor in carbon monoxide (CO) production, from a practical standpoint the temperature of the fuel bed is generally much more important. In practice, changes in air rates are seldom large enough to have a noticeable effect on carbon monoxide (CO) production. In any particular plant the rate of air input is pretty well fixed by such considerations as the capacity of the

blower, the type of fuel used, and the advisability of keeping the blasting time between the two and three minutes duration. Therefore not much can be accomplished in the control of carbon monoxide (CO) percentage by the variations of the air rate that are a practical possibility.

The reacting surface of the fuel is pretty much a constant for any given kind and size of fuel. This leaves the average temperature of the fuel bed as the really controlling factor.

The average fuel bed temperature is well under control by the operator. Since the chemical action of decomposing the steam during the run removes heat from the fire, it follows that, with a constant air in put, and for a given set of conditions, the average fuel bed temperature will depend on the amount of steam that is sent through the fire on each run. The problem of fuel bed temperature thus resolves itself to determining the proper steam input to give the highest all around efficiency.

We can put it this way: To produce a certain Btu per cubic foot in the finished gas, there is a definite relationship between the amount of heat to be stored in the generator and that to be stored in the carburetor and superheater. To get these proportions, a certain average percentage of carbon monoxide (CO) must be maintained in the generator blast gases, and to produce this percentage of carbon monoxide (CO) at some definite air rate, a definite average fuel bed temperature should be maintained.

Determination of the actual average temperature to be maintained is not important. It would not be the same in any two sets. What we are interested in is in producing the correct amount of carbon monoxide (CO) to properly heat the carburetor and superheater without its being necessary to waste some at the stack. Controlling average fuel bed temperature will do this.

Effect of Temperature at Top of Fire

Another factor directly related to the temperature of the fuel bed and having an important effect on the amount of carbon monoxide (CO) produced should not be overlooked. This is the distribution of temperature through the fire. There is a gradual decrease in temperature from the top of the combustion zone to the top of the fire, and this temperature differential is important in the control of carbon monoxide (CO) production.

No appreciable quantity of carbon monoxide (CO) will be formed when the temperature of the fuel bed is below about 1700° F. If the top of the fire is at a high temperature, more carbon monoxide (CO) will be produced than if it is at a relatively low temperature.

The control of temperature at the top of the fire is accomplished by control of the percentage of down steam used. Down run steam cools the top of the fire, and at the same time tends to increase the temperature at the bottom. Its use, however, is subject to limitations which we will discuss hereafter.

From a practical standpoint a coke fire that is cherry red on top, and slightly brighter around the edges, with a uniform texture at coaling time is usually about right for good operating conditions.

The Air-Steam Ratio

Since the average fuel bed tem perature is pretty much controlled by the amount of steam used per run as related to the amount of air used on the blow, a very useful figure in checking plant operations is that obtained by dividing the total cubic feet of air per blow by the total pounds of steam used on the run. This is the AIR/STEAM ratio and is the cubic feet of air per pound of steam.

For a given set of conditions the air-/steam ratio is an indicator of the average temperature of the fuel bed. This is so because the amount of air used controls the amount of heat liberated, and the amount of steam used determines the amount of heat taken from the fuel bed during the run. It is not a complete measure of fuel bed temperature, for all of the steam passing through the fire is not decomposed and all of the heat developed in the generator is not retained there, and this varies with different operating conditions. Generally speaking, however, low air/steam ratios mean cool fires and high ratios hotter ones.

It would be impossible to set up a figure to shoot at because conditions in no two generators are the same. Ratios between 25 and 45 cubic feet of air per pound of steam are in the range of usual practice. The real value of the figure is in comparing the day to day results of a given plant, and in running down the cause of poor operating figures.

Effect of Air-Steam Ratio on Blue Gas

The air/steam ratio used has a definite effect on the blue gas pro-

Operating Controls of Hand Operated five foot Water Gas Set.

duced. With low ratios the make of gas will be higher per run; but due to the cooler fire, its heating value will be lower, since more of the steam goes to carbon dioxide (CO_2) rather than carbon monoxide (CO) with cool fires. Fuel per MCF will generally be lower with low ratios because the fuel bed temperatures will be lower, and less heat will be lost by radiation and carried out of the machine in the make and waste gases. If it is desired to make all of the gas possible in the shortest time, low ratios are desirable. However, the poor quality of the blue gas will necessitate using more oil for enrichment; and we must choose between the two.

There is another consideration with low ratios. If the ratio is too low it may not be possible to develop enough heat in the carburetor since the cooler fire will be a low carbon monoxide (CO) producer. Unless oil results are to suffer it may be necessary to raise the ratio. With high ratios the quality of the blue gas will be better, due to more complete steam decomposition by the hotter fire; but fuel per MCF is bound to increase, because of increased losses resulting from the higher fuel bed temperatures. Gas per run usually decreases with high ratios, and it may be found that the hotter fire is producing more carbon monoxide (CO) on the blow than can be used in the carburetor.

The ideal ratio is generally one which produces the desired amount of carbon monoxide (CO) for heating the carburetor and superheater without waste, although price differentials between generator fuel and oil may make some other ratio more economical. In such case it is a matter of the operator's judgment, based on an understanding of the results to be obtained by following a certain course.

Practical Balancing of the Set

As a practical control of the blast gases from the generator, some changes in carbon monoxide (CO) production can be made by altering the percentage of down steam. More down steam will lower the temperature of the top of the fire and thus will result in less carbon monoxide (CO). Increasing down steam generally results in harder clinker, and for this reason it may not be practical to increase it. Carbon monoxide (CO) can often be increased, if necessary, by decreasing the amount of down steam. There is one danger in this, however. If low air-steam ratios are in use, thin weak fires may develop.

To bring the set into balance so that just the right percentage of carbon monoxide (CO) is produced to properly heat the carburetor and superheater without waste, it is generally desirable to alter the air/steam ratio in the direction which should produce the result wanted. It is usually better to do this by changing the steam rates rather than the amount of air per blow. Reducing air per blow will as a general rule reduce capacity. However, if higher ratios are wanted and blower capacity is such that there is more air available, increasing the air per blow will result in increased capacity and may be advisable.

It must be kept in mind that changing the air/steam ratio will change the quality and Btu of the blue gas and the amount of blue gas made per run, and a change in ratio will therefore probably require a change in the amount of oil per run needed. Changing the amount of oil per run will change the heat requirements of the carburetor and superheater to gasify the oil. This in turn will necessitate another change in the balance of heat between the generator and carburetor; and another adjustment, or even several, may have to be made before the set is in balance.

The conditions in the generator are constantly changing, and it must not be supposed that all that is necessary is to get the correct ratio and stick to it. The alert operator is constantly looking out for such changes and alters his operations to suit. When temporary conditions arise where too much or too little carbon monoxide is being produced on the blow, he should not be too hasty in changing air/steam ratios which have been satisfactory before. When carbon monoxide (CO) is high, high fire temperature is indicated. By shortening blows the fire temperature will fall more rapidly than usual on following runs, and the fire will thus work back to normal. Extending the blasting time for a cycle or two if carbon monoxide is low will also help to correct low fire temperature conditions.

Rate of Blasting

High rates of blasting (cubic feet of generator air per minute) are desirable from the standpoint of capacity and good fire conditions. High rates of air per minute allow shorter blows; and if short runs are used, fuel bed temperatures will be more uniform and fires in better condition for efficient blue gas making. Short cycles also increase capacity for the same reason.

The principal result of using high blast rates is to increase the rate of combustion in the bottom part of the fire. The reduction of CO_2 to CO is generally not affected. Sometimes increasing blast rates will decrease the carbon monoxide (CO) production, for since the carbon monoxide (CO) production increases with the temperature of the reduction zone and since the temperature of the reduction zone increases as the blow progresses; it follows that if blasting rate is increased and length of blow shortened, carbon monoxide (CO) production may be decreased somewhat. This effect is often offset by the fact that when blast rates are increased and blow shortened, and short runs used, the fire temperature does not drop as much during the run and the increased average fuel bed temperature works to produce more carbon monoxide (CO) per unit of time. However with the shorter blow there may be no increase in the total carbon monoxide (CO) produced.

With increased blasting rates the increased production of CO_2 in the combustion zone, per unit of time, shortens the length of time with which the CO_2 is in contact with the hot carbon in the reduction zone. It is doubtful that such changes in air rates that are possible in the usual operating cycle, change the time of contact enough to make much, if any, appreciable difference in the carbon monoxide (CO) production. The temperature of the fuel bed remains the principal factor, together with the temperature of the top of the fire, and all other factors are secondary to these.

Blasting rates of less than 150 cubic feet per minute per square foot of grate area are undesirable from the standpoint of both capacity and operation. The usual practice is to use rates from 175 to 200 cubic feet per minute and in some plants higher rates are used with success. Table 1 shows generator air per minute for three of the smaller machines at various rates per square foot of grate.

Blasting Time (Length of Blow)

The length of the blow will depend on the blasting rate and the amount of gas to be made on the run. As pointed out previously, short cycles are desirable to increase capacity and to avoid large temperature variations in the fuel bed. With such cycles gas per run will probably be less than with longer cycles, but since there will be more runs per hour, capacity will be better.

(Continued on page 76)

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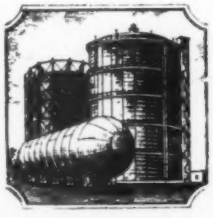

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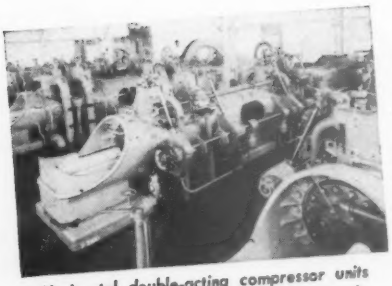

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50th Annual Convention of the Pacific Coast Gas Association

By

Fred A. Herr

POST-WAR PLANNING keynoted discussion at the 50th annual convention of the Pacific Coast Gas Association held at Hotel Ambassador, Los Angeles, September 22 and 23.

That the gas industry must decide now how to meet the problems and new developments which inevitably will make their appearance when the war is over was the theme which pervaded the three general sessions and the meetings of the Manufacturers', Sales-Advertising, Technical and Home Service Sections.

While the program for this Golden Anniversary Session had been reduced considerably in comparison with the four-day conventions of previous years, war transportation difficulties notwithstanding, the registration reached the surprising total of more than 600.

Association President F. M. Banks, vice-president of the Southern California Gas Co., officially declared the convention open at a luncheon meeting attended by 650 in the Ambassador Hotel Cocoanut Grove at noon on September 22.

In his welcoming address, Mr. Banks disclosed that the officers of the PCGA had given careful consideration to the propriety of calling an annual meeting during this time of travel congestion and preoccupation with war-connected duties. He declared that it had been decided that the gas industry's major part in so many activities affecting the war effort justified the holding of a convention at which leaders of the industry could compare notes and exchange ideas.

"The gas industry is growing in size and importance," Mr. Banks said in a review of the industry's progress. "Comparing 1942 with 1929, the gas industry nationally has increased its customers 15%, the Pacific Coast industry 50%; national sales increased 65%, the Pacific Coast 110%; national gross revenues 27%, Pacific Coast 50%.

"Any planning by any industry must include some sound thinking about the future of free enterprise. Our economy has always functioned on the basis that risks and initiative will be properly rewarded. With some corrective features, we all believe in the continuance of such an economy. The future welfare of the country may well depend upon how thoroughly we and others like us are able to point out the real values of an economy based on properly operated free enterprise. We shall need to operate our own business in a fashion that the people will not toss those values lightly aside for some ephemeral utopia which has no chance of functioning except in the dreams of the theorists—whose very motives we may question."

In the election of officers, the following were chosen unanimously:

President, E. L. Payne, vice-president and general manager, Payne Furnace & Supply Co., Beverly Hills, Calif.; vice-president, O. R. Doerr, general sales manager, Pacific Gas & Electric Co., San Francisco; treasurer, D. G. Martin, general auditor, Pacific Gas & Electric Co. Directors for two-year term: F. F. Doyle, manager, Natural Gas Division, Pacific Gas & Electric Co.; W. J. McCoy, comptroller and treasurer, Southern Counties Gas Co., Los Angeles; D. H. Perkins, superintendent, gas department, San Diego Gas & Electric Co.; and A. H. Sutton, president, Mission Water Heater Co., Los Angeles.

E. L. Payne

A. G. A. President Speaks

A. F. Bridge, president, American Gas Association and vice-president and general manager of the Southern Counties Gas Co., Los Angeles, next delivered a talk on "The Gas Industry at War." Declaring that no phase of the gas industry operations has been left unaffected by the war, Mr. Bridge cited the manifold and diverse problems imposed by war-created shortages of men, materials and transportation. These problems, he pointed out, daily test the ability of gas industry executives to adapt their organizations and procedures to new situations for which no precedents exist.

Mr. Bridge pointed to the gas industry's participation in the production of war products through the manufacture of hundreds of vital parts in the manufacture of which the use of gas figures importantly; such operations as forging, hardening, annealing and carburizing, various processes in the production of synthetic rubber, nylon, refrigerants, solvents, plastics and explosives.

Mr. Bridge declared that one interesting and important wartime de-

velopment in the use of gas is dehydration of foods for overseas shipment, for which gas is used for fuel almost exclusively because of its cleanliness and controllability. He further said:

"At the request of W.M.C., the gas industry is conducting a survey to determine what further may be done to conserve manpower. This problem is one of the toughest confronting us, but is so ramified that time will not permit me to cover it. One interesting change in operating procedure is the widespread shift to multi-monthly meter reading. Adopted initially in the first days of the war as a tire conservation measure, many utilities have recently turned to it as a means of reducing man-hours. While a number of plans have been adopted, I believe that bi-monthly reading with no estimated interim bill provides the optimum solution of this problem. Where there is a considerable variation in monthly unit consumption, as, for instance, where gas is utilized for space heating, it has been found impracticable to estimate the interim month's consumption with any acceptable degree of accuracy. I venture the prediction that multi-monthly reading and billing, in some form, will come into universal use and will remain with us after the war. This conclusion is based on the observation that the average monthly bill for utility service, expressed as a percentage of the consumer's monthly income, is now typically about half what it was a few years ago."

Rockwell on "Manufacturers at War"

The subject of the "Manufacturers at War" was treated next in a talk presented by Col. W. F. Rockwell, president, Association of Gas Appliance & Equipment Manufacturers, and President of the Pittsburgh-Equitable Meter Co., Pittsburgh, Pa.

Mr. Rockwell stated that when the "shooting war" is over there will develop a commercial war" . . . and we are not sure the same people will be on our side."

He cited the excellent work being done by manufacturers of gas equipment and appliances in taking over the job of producing rolled armor plate, most of which, he pointed out, is being produced by former gas industry manufacturers.

On post-war conversion of plants back to private production, Col. Rockwell said:

"It is a question of what the government will do with the plants after the war. Some of our privately-owned plants are not equipped with the latest machinery, but government-owned plants are. Many of us in private industry will have a tough job competing with the better equipped government plants. There is no negotiation when the government tells us we are going to pay back a certain amount of money or our plant will be taken away. If we have to buck business backed by unlimited government money and still operate by former old-established business principles, we are going to have a difficult job on our hands."

Talk By A. G. A. E. M. Director

The Manufacturers' section of the PCGA met in a separate session at 10 a.m. under the chairmanship of A. H. Sutton, president, Mission Water Heater Co. of Los Angeles.

In the opening talk, Mr. Sutton stated that apprehensions which he had formerly entertained concerning how well those manufacturers unable to convert to war goods production could survive the war period had proven to be unfounded.

The records show, Sutton said, that there are surprisingly few casualties despite virtual cessation in the manufacture of many types of appliances. Concerns unable to convert, Sutton explained, have somehow managed to keep their organizations together and are rendering worthwhile contributions to the war effort through servicing and maintenance of appliances in the hands of the public.

Sutton asserted that at this second wartime convention of the PCGA there was justification for viewing the future with more optimism than was the case a year ago. He referred to the partial relaxation of government regulations and permission to resume manufacture of several types of gas appliances as one of the favorable developments for manufacturers, which has occurred within the past two months.

While these revisions of orders do not represent a complete solution of the problems confronting the manufacturers, Sutton declared, they are definitely helpful. As a result, he asserted, of the easing of restrictions the industry is in a position to make a partial reconversion now and by so doing the gas appliance industry enjoys a distinct advantage over industries faced wtih total conversion after the war.

Manufacturers' Section

Reports were presented by four divisions of the Manufacturers' Section: E. S. Hoyt, Jr., Hoyt Heater Co., reported for the water heater division; C. Roy Ohnimus, Hammer-Bray Co., for the range division; F. C. Packer, Payne Furnace & Supply Co., for the heating division; and J. J. Delaney, Reliance Regulator Co., for the accessories division.

Principal speaker at the meeting of the Manufacturers' Section was H. Leigh Whitelaw, managing director, Association of Gas Appliance & Equipment Manufacturers.

Mr. Whitelaw stated: "There are four major undertakings on the part of the A.G.A. that should have a material bearing on our own post-war planning. Three of these should be of the utmost interest to the manufacturer and further demonstrate the value of our affiliations. Members of the A.G.A.E.M. are on these important committees and contribute much to the success of these projects. The first is the merchandising survey which was made among the utilities to determine what their policy would be in the merchandising of gas appliances after the war. This survey dispelled the rumor that major changes in merchandising policy were contemplated.

The second is a survey of the gas industry's needs and recommendations for improvements in pre-war appliances and new developments and new appliances for future sales. This survey will be the most extensive one ever made by the A.G.A., and the preference ratings, in whole "models" or in part accessories, is so complete that it should form the basis for intelligent planning for research, development, or production. Rosencrans' Committee on New and Post-War Gas Appliances, is preparing these surveys.

It has been prepared so as to make it possible to collect, collate and evaluate company opinions in such a way as to provide a picture of the nature and extent of the industry's needs from national, regional, or state viewpoints, as well as from the viewpoint of the natural, mixed, and manufactured gas companies.

The Post-War Planning Committee aims to determine what are the most needed improvements and developments in the five residential fields of ranges, refrigerators, water heaters, househeating, and air-conditioning, and certain combinations of these. So that definite findings may be made on the importance of these matters to the industry, you will note that a number of possible improvements have been listed for each appliance with the request that companies indicate the relative importance to them of these improvements. These are not intended to be limiting, and

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Giant cargo Clippers will girdle the globe. Distances will be sheared by flight over great circle routes. The shortest air lane from New York to Calcutta lies over Canada. Predictions of 2c mileage are being seriously discussed. Plans for huge, super-cargo ships of the air are already on the drafting board. Higher octane fuels to fly these air borne behemoths are emerging from the laboratories.

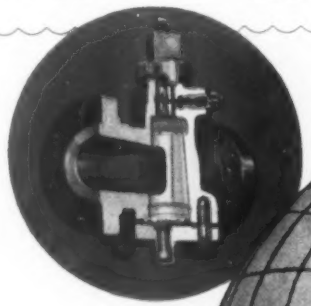
Under the new era of petro-chemistry, industry is making commendable strides in stepping up octane; discovering new power to drive the engines of tomorrow's planes. It means new equipment in refineries, new and more rigorous valve services, conversion from pilot plants to commercial production.

TRAVEL THE GREAT CIRCLE
(after Victory comes)

CHICAGO TO LONDON	$ 76.00
NEW YORK TO CALCUTTA	160.00
SAN FRANCISCO TO MELBOURNE	160.00
LOS ANGELES TO BUENOS AIRES	125.00
NEW YORK TO SHANGHAI	150.00

Nordstrom Valves will play a more important part than ever before in super-power fuel production. We have valves now ready for the demands that are certain to come – valves that will operate at highest pressures and temperatures, made of alloys best suited for the needs, armored against corrosion and erosion.

The aerial milk train to London, the transport plane to Moscow, the flying mail Clipper to Rio, will owe their economical success to super-powered fuel, produced through *Nordstrom Valves.*



Global Transportation

POWERED BY HIGHEST OCTANE GASOLINE — PRODUCED THROUGH *Nordstrom Valves*

These valves definitely SAVE TIME

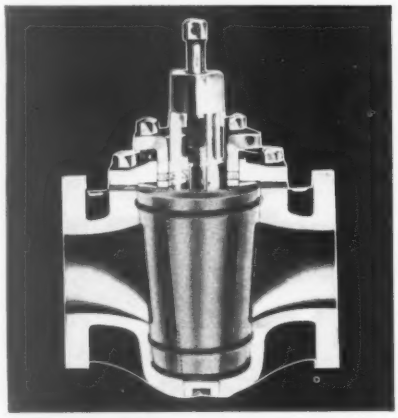
...and give miracle flow control

To make every minute count, production flow in thousands of plants must never cease. But a valve failure plays havoc with production. Bear in mind that lost time is *irretrievable.*

Nordstrom Valves have contributed to the war effort in immeasurable ways. Untold man-hours have been saved because of the simple, quick, positive operation of Nordstroms. Critical metals have been saved by reason of their compactness. Control of vital flow lines in gas plants, chemical plants, in refineries and out in the field have helped speed up production. Every Nordstrom installation is a *time-saver.*

KEEP UPKEEP DOWN

Nordstroms are enabling many plant operators to control lines where ordinary valves have failed. In refineries producing high power aviation fuel, where very high temperatures exist and where corrosion is a problem, the application of Nordstrom Valves is standard practice. The use of Merchrome Coating in valves to meet such extreme conditions has increased the life of these valves to a point little short of miraculous.



PRECISELY ENGINEERED FOR UNIVERSAL SERVICE

Just as aircraft development has made tremendous strides, so have Nordstrom Valves. The path of Nordstrom progress encompasses engineering technique in many of its ramifications. Constant chemical research, conclusive metallurgical tests, improved ways and means of machining and lapping, establishment of new physical standards and highly technical methods of gaging—all are involved in Nordstrom Valve building. The end result is the simplest of valve designs and greatly increased valve life. Only by mass production and concentration upon one basic type *(the lubricated plug type)* have we been able to offer these many plus values.

Bulletins upon request

Typical Example of Nordstrom Endurance

The above valve was installed in 1939 in a PHENOL plant of a large oil company handling phenol in concentrations up to 98% at 600° F. and 150 lbs. pressure. It was made of Stainless Steel, Merchrome Coated. Average length of life for a carbon steel valve in this service is six months. This valve is still in service. It was disassembled recently, merely for inspection, as shown above. The valve is in perfect condition, good for perhaps several more years of service. If you have a valve problem in your plant where corrosion or erosion is the cause, Nordstrom Merchrome Coated *(hard-faced)* Valves are the solution.

Nordstrom LUBRICATED VALVES

Sealdport Lubrication

MERCO NORDSTROM VALVE COMPANY – *A Subsidiary of Pittsburgh Equitable Meter Company*

WORLD'S LARGEST MANUFACTURERS OF LUBRICATED PLUG VALVES; GASOLINE, OIL & GREASE METERS

Main Offices: 400 Lexington Ave., Pittsburgh, Penna. • *Oakland (Calif.) Factory:* 2431 Peralta St.

BRANCHES: Buffalo, Chicago, Columbia, Des Moines, Houston, Kansas City, Los Angeles, Memphis, New York City, Oakland, San Francisco, Seattle, Tulsa

CANADIAN licensees: Peacock Bros., Ltd., Montreal • *EUROPEAN licensees:* Audley Engineering Co., Ltd., Newport, Shropshire, Eng.

SOUTH AMERICAN Representative: The Armco International Corporation. *Main Office:* Middletown, Ohio

PRODUCTS: Nordstrom Lubricated Valves; Air, Curb and Meter Cocks • Nordco Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators EMCO Regulators • Pittsburgh-National Meters for Gasoline, Grease, Oil, Water and other Liquids • Stupakoff Bottom Hole Gauges

companies are also requested to list and rank any other appliance improvements and developments which may be important to them, although not listed on this form. To enable these needs and recommendations to be interpreted in terms of potential sales, data is requested on sales of the appliances in each field during the calendar year 1941.

Officers of the Manufacturers' Section elected at this session are: General Chairman, A. H. Sutton, re-elected; vice-chairman, E. T. Howard, General Controls Co., Glendale, Calif.; Accessories Division, chairman, A. J. Delaney, Reliance Register Corp., Alhambra, Calif., and vice-chairman, J. D. O'Hagen; Heating Division, F. C. Packer, Payne Furnace & Supply Co., chairman, and C. A. Gabriel, vice-chairman; Range Division, Henry Ohnimus, Hammer-Bray Co., chairman, and Harry Jackson, Graham Manufacturing Co., San Francisco, vice-chairman; Water Heater Division, E. J. Hoyt, chairman, and R. W. Tarleton, Southern Heater Co., Compton, Calif. Alternates to A.G.A.E.M., F. C. Parker and Henry Honer, Western Stove Co., Los Angeles.

50th Annual Banquet

The 50th Annual Dinner was held in the Ambassador Hotel Fiesta Room beginning at 7:30 p.m., September 22. A nostalgic atmosphere prevailed as President Banks presented life membership cards to the only two living charter members of the PCGA: C.O.G. Miller of San Francisco, chairman of the board of the Pacific Lighting Corp.; and John Kempf, retired, former superintendent of an Oakland gas plant. Tribute was also paid to the late Charles F. Adams who at the time of his death on July 15 was a member of the Board of the Portland Gas & Coke Co., Portland, Ore., and a 50-year member of the association. Miller and Kempf are all that remain of that progressive group of west coast gas men who sat down to the first dinner of the newly born PCGA in 1893.

Introduced at the banquet were 16 other men who have been members of the PCGA continuously for 25 years or more. These included:

W. H. Henderson, superintendent of distribution, Southern California Gas Co., Los Angeles; H. K. Basford, Basford Co., San Francisco; F. C. Packer, assistant general manager, Payne Furnace & Supply Co., Beverly Hills; F. G. Schafer, retired, former vice-president and general manager, Southern California Gas Co.; F. S. Wade, president Southern California Gas Co. and Southern Counties Gas Co.; Frank Weiss, assistant to the vice-president, Southern California Gas Co.; E. V. Dailey, former sales manager, J. B. Clough Co.; H. W. Jackson, vice-president, James Graham Mfg. Co., San Francisco; William Moeller, Jr., vice-president, Southern California Gas Co.; G. P. Eggleston, vice-president and general manager, H. R. Basford Co., San Francisco; H. C. Webber, general superintendent, Tucson Gas & Electric Co., Tucson, Ariz.; A. E. Holloway, vice president in charge of sales, San Diego Gas & Electric Co.; N. R. McKee, vice president in charge of sales, Southern Counties Gas Co.; F. F. Doyle, manager, natural gas division, Pacific Gas & Electric Co., San Francisco; R. E. Fisher, vice-president, Pacific Gas & Electric Co.

Al. C. Joy of San Francisco, chairman of the Anniversary Programs Committee, served as master-of-ceremonies at the banquet. The entertainment program was highlighted by a skit in which players appeared dressed in the garb of the middle nineties. Considerable amusement was evoked by the reading of excerpts from a paper first presented at the 1893 convention, dealing with the then vital theme of whether or not the electric light would run the gas light out of business.

Second Day's Program

A general business session was held at 10 a.m. September 23, with F. M. Banks presiding. Highlight of this session was the presentation by H. L. Masser, Los Angeles, chairman of the PCGA's committee for Gas Industry Development, of a masterful outline of the outlook for the gas industry in the post-war period. The Masser report represented the most comprehensive and complete analysis of industry needs, present and post-war, which has as yet been prepared. It was characterized as such by C. V. Sorenson, chairman of the A.G.A. Post-War Planning Committee, who was present. Sorenson stated the Masser report will undoubtedly serve as the basis for similar reports in other sections of the country and will be of material aid to the A.G.A. in prevailing upon other local associations in tackling the problem.

The report presented a gas industry development plan for the PCGA in two principal classifications; commercial and economic phases; and technical and engineering phases.

The first classification was segregated into smaller related groups, including: a study of appliance market possibilities, such as new and replacement markets for domestic ranges and water heaters; sale of space heaters; refrigerator sales programs; possibilities and economics of air conditioning load; advertising and sales promotion; post-war construction programs; rate structures and their effects and applications; economies in operation; natural gas conservation; gas manufacturing methods; improvement of utilization equipment; distribution and construction departments; co-ordination within the industry—public relations.

Predicts Greater Electric Competition

The Masser report contained the prediction that the post-war period is certain to bring about more intense electric competition than ever before in the field of domestic usage. Present advertising by large manufacturers, the report pointed out, is paving the way for the sale of electric ranges, water heaters, refrigerators and a complete line of "all electric" kitchen equipment.

"The gas industry cannot let this situation go unchallenged," Mr. Masser said. "We must be able to achieve at least as good a ratio of new appliance sales as our competitors. The volume of domestic appliance sales will be measured by the post-war extent of new home building and major house remodeling. Load surveys show a very high saturation of gas ranges, usually averaging ninety-odd percent of the number of meters. However, when we come to water heaters we encounter a very abrupt drop in number. Obviously this shows the large potential new and replacement market for these appliances.

"At present," Mr. Masser pointed out, "industrial gas sales have generally increased to near the limit of ability of the companies to supply. With the return of peacetime we may well anticipate a material reduction in the volume of gas sales and corresponding revenues. There is nothing we can do about the unit reduction of the customer's usage, so long as he does not change or increase the number of his appliances. However, in many cases the customer can be sold new and additional appliances, which should be one of our major objectives.

"Under the present average natural gas rates, gas has a cost advantage of about three to one over electricity at 1c per kw-hr, and on the basis of net recovered heat. Therefore, we should not lose sight of the fact that where the job is a heating process, gas

generally has the advantage. We do not want the gas business pirated away from us, and by the same token we should not endeavor to deny electricity its proper field."

Touching upon improvement of gas utilization equipment, Mr. Masser said that the gas range is the industry's key appliance and that frank analyses must be given the design, performance and construction of present equipment. He stated that endeavors must be made to produce new appliances which will best meet most of the features the public demands, particularly "eye appeal."

Masser cited suggested improvements for CP range design in the matter of top surfaces, top burners, ovens, broilers and accessories. He reported that it is proposed that a committee be formed to thoroughly study gas range designs and collaborate with manufacturers through their associates for the purpose of developing practical plans at an early date that will assure the gas range industry of having ranges that will command customer preference.

Masser asserted that the gas industry should be prepared to meet the competitive electric program by a unified plan to offer equipment of standardized dimensions and styles which will form harmonizing groups.

Among proposals for new appliances, Masser said it seems an anomaly that the gas industry does not have an automatic dishwasher to offer its customers. He urged appliance manufacturers seriously to study the possibilities of a gas dishwasher which might well, he stated, become a major unit of the all-gas kitchen. Gas range venting has likewise received too little attention, Masser stated.

Sorenson and Ruthenburg Speak

Chairman Sorenson of the A.G.A. Post-War Planning Committee, Hammond, Ind., followed Mr. Masser on the speaker's dais with an outline of the "Post-War Program of the American Gas Association."

Louis Ruthenburg, president of Servel, Inc., presented an inspirational talk on the "Fifth Freedom," which he defined as freedom of initiative and individual enterprise, a heritage which he urged gas men to preserve.

New President Installed

The final general business session was held at noon, September 23, with Chairman Banks presiding. Major General Walter K. Wilson, commander of the northern California sector, Western Defense Command, spoke of the need of maintaining home-front morale and of the duty of the civilian population to back up the front-line fighters with war plant production.

Another speaker was Col. Robert A. Hornby, 1941 president of the PCGA and vice-president of the Pacific Lighting Corp., now personnel staff officer at the Army Air Forces West Coast Training Center, Santa Ana, Calif.

Chairman Banks presented prizes for outstanding work in the women's division to Gladys Warren of the San Diego Gas & Electric Co.; and Dolly Eden of the San Joaquin Division of the Pacific Gas & Electric Co. of San Francisco. The Basford Award for outstanding achievement was presented to A. H. Sutton, chairman of the Manufacturers' Section.

As the closing rite at this session, Retiring President Banks surrendered the diamond-studded badge, emblematic of the association's highest office, to incoming president E. L. Payne; and A. F. Bridge, president of the American Gas Association, pinned the past-president's badge upon Mr. Banks.

Sections Meet in Afternoon

The Sales and Advertising Section met at 2 p.m. September 23, with R. J. Phillips, San Diego Gas & Electric Co., presiding. A report on the section's post-war appliance committee's activity was presented by W. M. Jacobs of the Southern California Gas Co. B. W. Reynolds of the Pacific Gas & Electric Co. led a discussion on the "Gas Appliance Situation."

Clifford Johnstone
Managing Director Pacific
Coast Gas Association

Meeting at the same hour was the Technical Section, with F. F. Doyle of San Francisco presiding. C. P. De Jonge, San Diego Gas & Electric Co., presented a paper on "Design of Networks for Housing Projects."

Centralized planning of street department work as conducted by the Southern California Gas Co. was presented in three papers, each treating a different phase of the work: "Dispatching," by J. F. Stafford; "Production Forecasting and Control," by C. N. Hardin; and "Engineering Job Planning" by W. G. Cox.

Appliance Exhibit

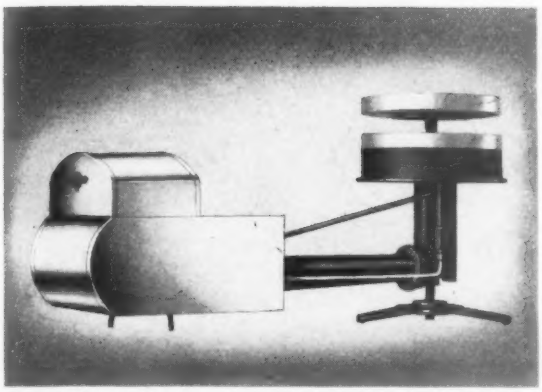
Nowhere was the effect of the war on the gas industry more readily apparent than in the appliance manufacturers' exhibit which was held in conjunction with the convention. Twenty-three manufacturers of appliances and equipment sponsored booths. With practically all the items on display related in some manner or other to the war effort, the exhibit was a tribute to the complete manner in which manufacturers have converted to war production.

Exhibits were sponsored by the following firms: Continental Water Heater Co.; Mission Water Heater Co.; Day & Night Mfg. Co.; Grayson Heat Control Co.; General Controls Corp.; Whitehead Metals Products Co.; Pittsburgh Equitable Meter Co.; H. A. Basford Co.; Utility Fan Corp.; Rheem Mfg. Co.; Hammer-Bray Co.; American Gas Association; Servel, Inc.; Payne Furnace and Supply Co.; James Graham Mfg. Co.; O'Keefe & Merritt; Reliance Regulator Co.; Southern California Gas Co.; American Meter Co.; Sprague Meter Co.; Hammell Radiator Corp.; Merco-Nordstrom Co. and Hoyt Heater Co.

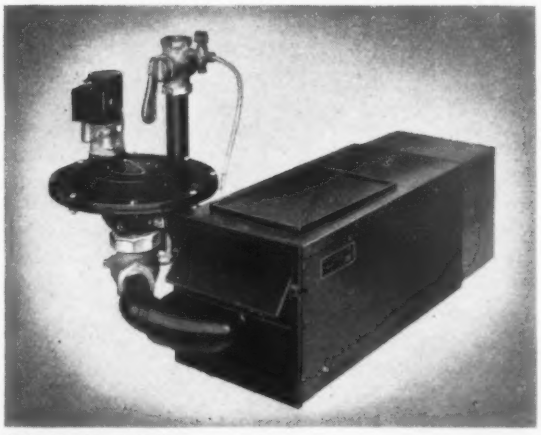
Arrangements for the convention were handled under the general direction of N. R. McKee. Members of the committee included Mrs. F. M. Banks, hostess; A. R. Combs, transportation; E. E. Ellis, properties; A. C. Joy, anniversary program; Clyde H. Potter, hotel and banquet; and W. C. D. West, registration.

Also contributing in a large measure to the success of the convention were Clifford Johnstone of San Francisco, managing director of the PCGA; Carl Swigard, manager of the PCGA Los Angeles office; Otto C. Mauthe and James T. Van Rensselaer of the Southern California Gas Co., who handled press relations.

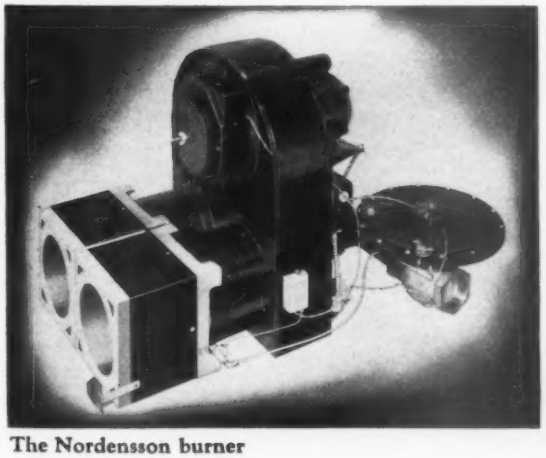
EFFICIENCY is the first lesson of War!



The Series 84 burner



The Series 400 burner



The Nordensson burner

This is a time of great achievement--in industry as well as on the battle-fronts--we have written a new meaning for the word EFFICIENCY. This new awareness of what can be done when the order of the day is MUST will be reflected, when peace comes, in a demand for greater home comforts which must be and will be fulfilled.

In the heating field, Gas will be the preferred fuel. And in the field of Gas heating Gordon Spreader Flame Burners, domestic, commercial, industrial, will illustrate the new, broader meaning of the word EFFICIENCY.

The GORDON SPREADER-FLAME CONVERSION GAS BURNER

The Series 84 burner is of the "upshot", vertical firing, designed primarily for round or square combustion chambers 13" to 30" in diameter. Adjustable gas orifice and telescoping mixer make possible wide range in capacity without loss of efficiency.

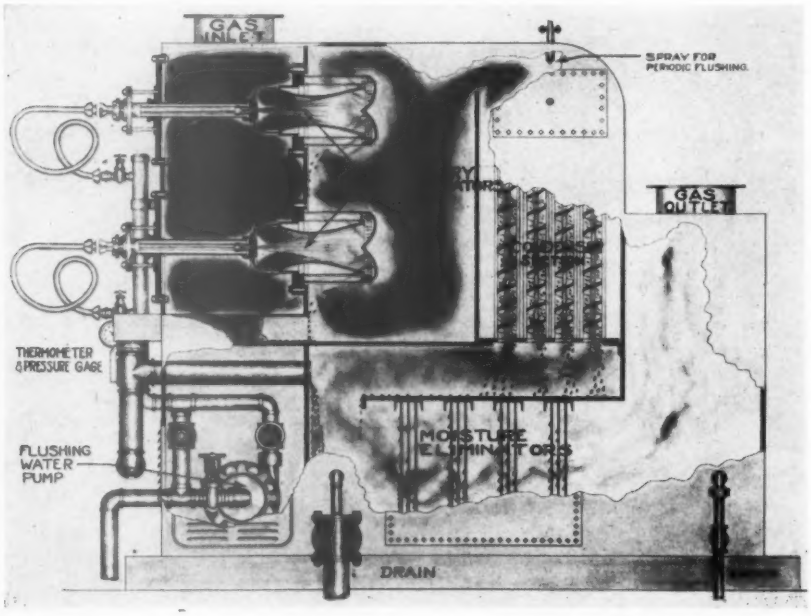
The Series 400 burner is of "gun" type horizontal firing, designed for use in square or rectangular combustion chambers. This burner and modifications is standard equipment on a majority of the country's air conditioners.

The Nordensson Forced Draft Gas Burner is used extensively in commercial and industrial heating and power boilers, as well as many types of furnaces, driers, core ovens, etc. Especially recommended where only low gas pressure and draft are obtainable.

Domestic, Commercial, Industrial Gas Burners for Boilers and Furnaces from 1/8-10,000 H.P.

ROBERTS-GORDON
APPLIANCE CORPORATION
BUFFALO NEW YORK

For All Gas Cleaning and Washing Operations
A New Principle is Employed in Our
STATIONARY DISINTEGRATOR



The Stationary Disintegrator is employed for gas washing and cleaning operations in tar scrubbers, ammonia washers and in liquid purification. It provides intimacy of contact not heretofore available.

Among the many advantages it offers are:

1. Small amount of space required. For example, a scrubber having a capacity of ten million cubic feet per day requires a space 8 ft. wide by 16 ft. long and 12 ft. in height.
2. There are no moving parts.
3. High efficiency. Tar scrubbers now in operation are reducing the tar to one grain per hundred cubic feet or less.
4. Low operating cost. The principal expense is the pumping cost in supplying fluid to the disintegrator.
5. Low installation cost. Usually the cost of this equipment is substantially less than the cost of tower washers.

Operating experience has demonstrated that a substantial amount of the hydrogen sulphide in the gas is removed by the wash water in the tar scrubber.

The life of the oxide in the purifying boxes is increased due to the lesser amount of hydrogen sulphide in the gas. Furthermore, the cleanliness of the gas materially reduces the amount of tar deposit in oxide boxes and thus eliminates channeling.

Prices quoted upon receipt of pertinent information. Deliveries can be made promptly upon purchase orders accompanied by satisfactory priorities. Address inquiries to our New York Office, 420 Lexington Ave., New York 17.

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BUILDERS OF CURRAN-KNOWLES BY-PRODUCT COKING PLANTS, GAS MAKING FACILITIES AND CURRAN GAS WASHERS AND PURIFIERS

RECENT COURT DECISIONS
Affecting Gas Utilities

How Gas Companies May Avoid Liability For Explosion Injuries

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

A GREAT DEAL of time, effort, expense, inconvenience and suspense is caused gas company officials and employes in suits resulting from gas explosions. Invariably the damaged person contends that the explosion resulted through negligence of the gas company employes.

In order to convey dependable legal information as to when, and under what circumstances, the complaining party must prove that the explosion resulted from negligence of gas company officials and employes, we shall review several higher court decisions reported since January of this year.

Only a small percentage of injured persons are held by the higher courts to be entitled to recover any damages, for gas explosions, because many elements must necessarily be in favor of the injured person. First, under certain circumstances the injured person must prove that the injury resulted from negligence of the company being sued; second, the testimony must prove that the injury did not result from negligence on the part of the injured person; and, third, the higher court must agree with the decision rendered by the lower court, and simultaneously verify the validity of the complete legal procedure, including presented testimony, instructions given the jury, and effectiveness of various state, county and city laws.

Ownership of Equipment

An important consideration when determining the liability and responsibility for an explosion of gas is: Did the gas company control or own all of the pipes and equipment involved in the explosion?

This same rule of law is applicable to persons, as contractors, employed by a property owner.

For example, Gerhart v. Southern California Gas Company, 132 pac. (2d) 874, reported January, 1943, it was disclosed that a plumbing and heating contractor was delegated to do the necessary plumbing work incident to the installation of a new courthouse heating system and relocation of gas piping on the courthouse grounds. This required running certain pipe from the courthouse to a vault constructed by the county, in which a gas meter was to be located. The assembling of certain pipes and valves by the county controlling the intake of the gas was also required in the vault. The gas company, by reason of the new work was required to move its meter from under the courthouse into the vault, to run pipe as a source of supply of gas to that new location, to make the necessary installations and connections in the vault between the source of supply and the meter and to connect the meter to the pipes. The day after the contractor installed certain pipes an explosion occurred. The contractor was severely burned and he sued the gas company to recover damages. During the trial testimony was given that within a short time after the explosion all the piping in the vault was tested, and with the exception of a small leak found in the county piping no leaks were found. The source of the gas which exploded was never discovered. However, since the contractor installed, controlled and managed the pipe connecting the outlet side of the temporary meter with the pipes within the vault, the higher court refused to hold the company liable, and said:

"From the evidence in this case it is apparent (1) that the source of the escaping gas was never discovered; (2) that the defendant installed and controlled only a portion of the piping and appliances in the vault and did not own or control the vault; (3) a substantial portion of the piping and appliances in the vault were installed on behalf of and controlled by the county of San Bernardino; (4) the installation of the appellant was tested and found gastight both before and after the accident; and (5) the gas could as readily have escaped from the county's piping as it could have from the appellant's piping. It therefore appears that appellant (gas company) installed and had control of only a portion of the piping within the vault."

Also, see Hohnemann v. Pacific Gas & Electric Co., 96 Pac. (2)350. It was shown that a fatal explosion was caused by an employe of a gas company negligently turning on the wrong meter, or by the negligence of the property owner or someone else in leaving an open pipe in the house or by both concurrently.

An explosion occurred and the property owner was killed. His dependents sued the gas company to recover damages, but the higher court held the company not liable, and said:

"In this case the meter was exclusively owned and controlled by defendant (gas) corporation; the pipe and cap thereon exclusively by the decedent (property owner). In other words, neither the decedent nor the defendant had control of both the swivel connection of the meter and the pipe and cap thereon in the apartment."

Also, see City of Oakland v. Pacific Gas & Electric Company, 47 Cal. App. (2d) 444. There the gas company was serving from a main supply line located in the street through a meter located in the basement of the

building in question. At a point beyond the meter (i.e., on the customer's side), a leak occurred, causing damage.

In this case the higher court clearly explained that where a gas company owns and maintains only a portion of the pipes and appliances, there can be no liability unless the complaining party proves conclusively that the damage resulted from negligence on the part of the gas company officials or employes.

On the other hand, it is important to know that if a gas company has exclusive control and ownership of pipes and appliances involved in an explosion the gas company cannot avoid liability unless its counsel proves that the explosion did *not* result from negligence of the company officials and employes. See Smith v. Southern Counties Gas Company, 264 Pac. 532. In this case the testimony proved that the manhole and all the gas pipes were installed and maintained exclusively by the gas company. The court held the gas company liable unless it proved conclusively that negligence of none of its officials or employes caused the explosion. For other higher court cases involving this subject of law, see Searles v. Manhattan Ry. Co., 101 N. Y. 661, 5 N. E. 66; Harrison v. Sutter Street Ry. Co., 134 Cal. 549, 66 P. 787, 55 L.R.A. 608; Olson v. Whitthorne & Swan, 263 P. 518, 58 A.L.R. 129; Rosenbaum v. First Doe Luce, 96 Cal. App. 149, 273 P. 862; National Sheet Metal Roofing Co. v. New York Tel. Co., 137 A. 409, 5 N. J. Misc. 503.

City and Gas Company Liable

A striking example of a company's liability for injuries negligently caused by gas mains and appliances, owned and controlled by the company, is found in Ruhl v. City of Philadelphia, 29 Atl. (2d) 784, reported February, 1943.

The testimony showed that an explosion was caused by gas leaking from a gas main which was undermined by a leaking water main. The testimony showed that the gas company was in exclusive possession and control of its gas and gas mains. For two years the neighbors had smelled escaping gas and had notified the gas company. The last notification was three days before the explosions. The gas company did not try to locate the leak. It did not repair its leaking main or shut off the gas. Also, the Water Bureau of the city received approximately a score of complaints about leaks in the water mains in this particular street and these complaints were followed by repairs, but such repairs did not prevent escape of water undermining the gas main.

The dependents of a person killed by the explosions sued both the city and the gas company. In holding both liable in heavy damages, the higher court said:

"In this case the gas company takes the position that the gas main was undermined by subterranean water leaks which should have been discovered and corrected by the city . . . . Each defendant tried to lay the blame upon the other * * * and each succeeded against the other."

Damages Are Speculative

Frequently, although alleged damages are speculative, the jury may allow heavy damages. But, usually the higher court will reverse a damage verdict based upon mere speculation or highly imaginary losses.

For example, in Bishop v. East Ohio Gas Company, 36 N. E. (2d) 479, it was shown that a chemist testified that he spent five and a half hours per day over a period of about ten years, totalling 20,000 hours, in developing a liquid called "Almalac." He claimed that as a result of his ex-

Save GAS, MANPOWER, CRITICAL MATERIALS, TIME, MONEY

with Carboseal Anti-Leak

Carboseal Anti-Leak saves gas by stopping leaks in the bell-and-spigot joints of dry-gas systems. The liquid compound swells the joint packing and stops the leaks. Reductions of 100 per cent in joint leakage are common. Reports show that joints in mains treated seven years ago are still tight.

Carboseal Anti-Leak saves manpower in two ways. First, only a small crew is required to apply it. And, second, service calls due to dust trouble are reduced, because the Anti-Leak thoroughly wets the main and lays the dust.

Carboseal Anti-Leak saves critical materials, largely eliminating the steel and rubber necessary for other methods of leakage control.

Carboseal Anti-Leak saves time. Its application by gravity flow inside the mains requires an average of four filling connections to the main per mile—excavation and repaving are almost eliminated.

Carboseal Anti-Leak saves money. The average cost of the Anti-Leak treatment is about 50 cents per joint, a fraction of the cost of leakage correction by other means.

For additional information, write for the book, "Correcting Leakage in Gas Distribution Systems with CARBOSEAL Anti-Leak."

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PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

periments and analyses he isolated and incubated various bacilli, in number fourteen different germs, and eventually retained five as suitable for his purpose. He sued a gas company for $50,000 damages claiming that an agent of the gas company unlawfully and forcibly broke into the basement of his residence, for the purpose of turning off the gas and that the agent in some way broke and destroyed the liquid denominated "Almalac."

The lower court granted a verdict of $10,500 in favor of the chemist. The company appealed to the higher court which reversed the lower court's verdict, and said:

"The judgment in this case is reversed for the reason that it is excessive, appearing to have been influenced by passion or prejudice, . . . If time and effort in the production of a model by an inventor, or a sample or formula by a chemist, is to be included as an item of damage for the destruction of the model or the formula perfected by the chemist or inventor, the one who succeeded in his efforts in a few days would be at a great disadvantage."

Special Agent's Authority

There are two kinds of agents, namely: General and special. An employer is responsible for all acts performed by a general agent within the scope of his regular duties, but he is responsible only for special and limited acts of a special agent. For example, a meter reader, and many other employes, as clerks, bookkeepers, etc., are special agents.

In Milligan v. Georgia Company, 22 S.E. (2d) 662, it was disclosed that a suit was filed by an injured customer who testified that he had notified the company's meter reader of a dangerous condition, and that his failure to notify the company officials resulted in the injury. In refusing to hold the company liable, the court said:

"The meter reader was not such a person as that notice to him of any defective and dangerous wiring would bind his employer."

Rule Void

Modern higher courts hold that failure of a gas company to abide by a void law, ordinance or Public Service Commission's rule is not negligence.

For illustration, in Lone Star Gas Company v. Kelly, 166 S. W. (2d) 191, reported December, 1942, an employer sued a gas company for damages as result of a gas explosion. The suit was based solely upon the company's failure to odorize its gas, as provided by Commission's rule. The higher court held the Commission's rule void and, therefore, held the gas company not liable for the explosion injury. This court said:

"That rule is void and therefore did not bind the defendant (gas company) to perform a duty attempted to be imposed by it. The failure of defendant to perform an alleged duty which it did not owe will not be considered in law negligence."

Independent Contractor Law

An independent contractor legally is an employer who cannot obtain protection under Workmen's Compensation laws.

An independent contractor is one whose services are rendered in the course of an independent occupation, and the desire of the employer is represented only as to the result of the work to be performed, and *not* as to the means by which it is carried out or the details in its performance.

For example, in Bridwell v. Bernard, 159 S. W. (2d) 981, recently reported, it was shown that a welder was employed to weld a gas tank. He was to be paid a stipulated sum for the work. In other words, he contracted to do the job for a specified amount. While doing the welding work an explosion occurred and he sustained severe injuries.

The evidence showed conclusively that when the welder began work on the tank, gas from the storage tanks had been cut off. During the time he was working, the company's employes connected the pipes between the tanks, without the knowledge of the welder, and gas went into the tank.

Subsequently the higher court held that the welder is an independent contractor under the law and that he had no cause of action under the Workmen's Compensation Act.

Also, the court held the gas company liable for $1500 damages.

Also, see Chutuk v. Southern Counties Gas Company of California, 132 Pac. (2d) 193, reported January, 1943. In this case it was shown that a contractor constructed a sewer, and received injuries as the result of an explosion which occurred while he was inspecting a deep manhole in the sewer line.

The gas main of the gas company practically paralleled the sewer line and was in close proximity thereto. It was stipulated during the trial that the gas company was the only company distributing gas in that vicinity

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and it was conceded that the gas which caused the explosion had escaped from the gas main lines. Therefore, the higher court held the gas company liable, and said:

"Defendant (company) first contends that the evidence was insufficient to show negligence on the part of the defendant but we find no merit in this contention."

Liability Distinctions

Persons who come upon a gas company's property are classified as invitees and gratuitous licensees. The former may be salesmen, or others who are permitted to come onto the property for business purposes, and "gratuitous licensees" are persons who come upon the property without an invitation, as trespassers, and others who have no business or other reasons likely to benefit the property owner.

In general, the distinction between the legal duties owing an invitee and those owing a mere gratuitous licensee is that the invitee is entitled to expect the property owner to take reasonable care to discover the actual condition of the premises and either make them safe or warn him of the dangerous condition, while the property owner does not owe to the gratuitous licensee the duty of exercising reasonable care to discover the condition of the premises. He does, nevertheless owe the licensee the duty of refraining from willfully or wantonly causing him injury or from committing acive negligence resulting in his injury, and if the harm caused to the gratuitous licensee is the result of a natural or artificial condition of the property, known to the property owner and which he should realize involves an unreasonable risk to the licensee, the property owner owes the licensee the duty to make the condition reasonably safe or to warn him of the condition and the risk involved therein.

The higher duty owing the invitee attaches by reason of the fact that the visit is or may be financially beneficial to the property owner but since the property owner has no financial interest in the entry of the gratuitous licensee, the latter is entitled to expect nothing more than an honest disclosure of the dangers which are known to the possessor.

For instance, in Kentucky & West Virginia Power Co. v. Stacy, 164 S. W. (2d) 537, reported November, 1942, it was disclosed that a gas company official permitted members of the County Farm to meet on their property for the transaction of business in which the company had no interest or concern. Those in attendance were granted permission to use the building as an accommodation. No rent was paid for the use of the hall, and the company received no benefit whatever from the presence of those attending the meeting.

A gas explosion occurred as a result of alleged negligence of the gas company officials and members of the County Farm were injured. The lower court held the gas company liable, but the higher court reversed the verdict, and said:

"The defendant (gas company) did not demand, nor did it receive or expect to receive, nor did those using the premises expect to pay, rent for the use of the building. Its use was granted as a mere courtesy. That being true, the plaintiff at the time of the accident occupied the premises as a gratuitous licensee and the defendant owed him no duty to discover the gas which exploded and caused the accident."

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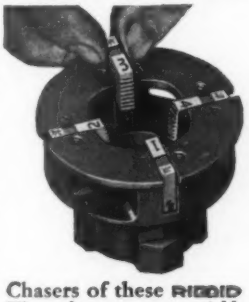

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American Gas Journal
53 Park Place, New York

Emergency Winter Operating Problems

By
E. S. Umstead
Providence Gas Company

WHAT is being done to overcome heavy load conditions in distribution? This was the original inquiry from the directors of our Operators Division. This inquiry was prompted by the heavy load conditions of last winter 1942-43.

New England distribution men were asked to furnish the information to this inquiry. It had a two-fold reaction. Informs us all of the plans and activities since last winter. Makes all conscious of the duty and advisability of a review of their last winter experiences in preparation for the coming winter of 1943-44.

The replies were prompt and gratifying. Indicated alertness, detailed activity, and determination to meet this coming winter's challenge and carry on in our nation's needs. Another note of satisfaction is that the overall carrying capacity of the distribution system has been thoughtfully designed and constructed.

This has been a long time, long range contribution. Continuous application to the study and construction of this system has its compensation in knowing that it will meet the challenge and urgency of these trying times. The New England distribution systems take their place in our nation's systems creditably and do the part assigned to them.

The activities are well expressed in the following quoted replies received. Part 1—To Meet Heavy Load Conditions. Part 2—To Overcome Heavy Load Conditions (Curtailment).

(The number of meters served precedes the reply of the individual company.)

Part 1—To Meet Heavy Load Conditions

61,000 meters—Our problem last winter as well as the coming winter would be along production lines rather than distribution, and we feel that we are in much better shape production-wise than we were a year ago due to plant changes made this summer, whereby we hope to increase our water gas production abilities about 25% which, with purchased gas abilities, might increase our total sendout ability by say 10%.

To meet heavy loads, we would increase governor settings at holder outlets and increase pressure in our intermediate pressure mains feeding district governors. We have one bullet of 350,000 cubic feet capacity at 50# pressure on the end of one of our districts with a compressor for filling out of a low pressure holder at the same point.

We feel that our main system is adequate for any reasonably expected loads. The only weak spot last winter has been corrected by the extension of 3,000 feet of feeder main.

It is my hope and opinion that the coming winter will not be as much of a problem as last winter as we have taken on very little additional load and sendouts for 1943 are now about on a par with the same months in 1942.

17,000 meters—We were pretty close to the borderline last winter but this winter we will be better situated because at the present time we are making changes at the plant which will increase our capacity from a peak day of 4,000,000 last winter to anywhere from 4,500,000 to 6,000,000 this winter. Last winter we cut a bleeder from our high pressure system into the low pressure system through a governor which enabled us to overcome sudden drops in pressure approximately two miles from the plant.

54,000 meters—From the experiences of last winter which showed where our low spots were, we started in this spring to get in shape for the same kind of a season this year. We are installing a new compressor on our high pressure system and a new and larger booster on our belt line. The governors have been overhauled and put in condition.

We did not have to curtail any service to our customers last year but this year we are 10% above last year. We think with the additions to plant and new connections on our distribution system that we can get by. If we should have any trouble, we have some very large consumers that we can ask to cut down during our peak loads.

5,400 meters—We are looking forward to having all our production work completed by December 15, 1943 and at present the prospects look good. This program will double our present generating capacity, take care of all our existing war demands and should carry us into a good post-war gas business.

Our system is 90% low pressure distribution through a station governor backed up by an initial pressure of 18 inches. We have had no defense housing problems and do not expect our low pressure system to be overtaxed.

The high-pressure side of the picture has been taken care of by dual connections to a new high speed Roots - Connersville Exhauster, so piped that it may be used either as an exhauster or a gas booster. When used as a gas booster it will double our present capacity.

47,000 meters—To meet heavy load conditions last winter we had to increase our pressure at the holder outlet to compensate for the increased use.

15,000 meters—Governor pressure can be increased by fan blower and permit maintenance of pressure on system until holders are grounded. General increase of pressure throughout system ample to supply demand. All low pressure here.

32,000 meters—We are equipped with blowers to impress a suitable pressure on the holder governors in the event of uncupping.

Booster mains at the present time are fed into distribution mains through open ends; valves are manually controlled.

30,900 meters—To raise the minimum on the system, increase the pressure at the holder by bypassing station governor and putting the full holder pressure on the town (8½"). In extreme emergencies, putting fan blower, now used for transfer of gas from plant to distant holder station, directly on the town.

Contemplated addition of 2 - 3,000 cu. ft. cylindrical tanks to existing bullet of 20,000 cu. ft. displacement with permanent compressor installation for filling all tanks at 65 lbs. pressure, at the end of the 4" high pressure transmission line supplying one of our outlying towns.

8,916 meters—A system supplied with low pressure. The feeder mains supplying outlying district regulators required a maximum pressure of 30 inches for peak loads of 1942-43

winter. Installed equipment is adequate to raise this to 60 inches if necessary.

24,000 meters—Service connections from pumping main could be worked out in the case of one large war industry.

295,000 meters—We have bypass connections from feeder mains to the low pressure mains.

There are service connections from pumping mains to temporary war industry customers.

High pressure area provided with bullets.

29,400 meters—Will increase governor settings at the holder outlet to the limit of the holder pressure, and if governor valve drops wide open, the governors will be bypassed. Increase feeder main pressure where possible.

22,000 meters—Increase the governor pressure at the holder outlet to raise minimum in system.

* * * * *

(From the replies, no company was required to install larger district governors.)

Part 2—To Overcome Heavy Load Conditions (Curtailment)

War Production Board Limitation Order L-174 sets up machinery for curtailed deliveries of manufactured gas when an actual shortage occurs.

First to be cut in such cases would be consumers whose contracts with the utility give the utility the privilege of interruption. This would not apply to war plants and essential civilian services which do not have standby facilities.

If this cut should be insufficient, the following consumers would be curtailed in order:

Any consumers having standby facilities.

Other consumers not in the war industry and essential civilian category.

Last, the war industries and essential civilian services which are not specially exempted by WPB.

* * * * *

The many replies indicate that SURVEYS and ADVANCE CONTACTS with customers have been made and schedules prepared.

The many methods of putting schedules in effect are:

Customer Lists
Personal Contact
Telephone
Letter
Newspaper Advertising
Bill Inserts
Billboard Advertising
Radio Appeal
Sound Trucks
Air Raid Wardens
Telegrams

Plans for publicity to reduce auxiliary heating, house heating, water heating, cover emergency, or on peak days, and for entire winter season.

Pre-arranged agreement with large industrial consumers.

Lowering of thermostats on house heating, auxiliary heating and water heating.

39,400 meters—As for emergency plans, we shall have to improvise as the emergency arises, since we have a reasonable expectation of passing through the coming winter without undue difficulty.

29,400 meters—Many of the large users have been personally contacted and we have a fair estimate of the volume that can be curtailed by the voluntary cooperation of these customers.

Studies of customers' accounts, by sections, have been made and a fair idea obtained of the peak hour consumption of each section.

Present valve control permits cutting the system into five sections to isolate in an emergency, according to class of customers, volume to be curtailed and speed with which the emergency must be handled.

Plans have been completed for cutting one of the large sections into two or three sections by installing additional valves in system.

Have given preliminary training to employees not usually engaged in field work.

53,000 meters—In the event of a critical shortage of GAS OIL, or other unexpected emergency, we have a complete program prepared. This includes emergency broadcast by radio directed to every household, setting forth the seriousness of the situation and requesting or prohibiting the use of the gas range for kitchen heat, or the broiler or oven for any purpose, as well as the water heater.

61,000 meters—I realize that the job of curtailment would fall on the Distribution Department in the event of a gas shortage and we will probably follow much the same pattern as we were set up to adopt last winter.

40,000 meters—Day sendout revealed 62% space heating. A large majority of our residential customers have no central heating facilities and consequently we have a very high saturation of room heaters using kerosene grades of oil. Consequently the gas range oven heating load is our CHIEF WORRY. It is estimated that on our peak day of the last season when 62% or 5,123,000 C.F. of our sendout was for space heating, 263,000 C.F. is estimated range oven heating.

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REED MFG. COMPANY
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Before the heating season starts we will again request our heating customers, through a letter, to conserve their use. *We will bring up to date* our telephone list of larger commercial heating customers and non-essential industries so that we may either request or demand gas curtailment on a moment's notice. We will also study again the individual situation of each of our large essential industrial customers to learn what curtailment each could make at a moment's notice without affecting production seriously.

Last year we did some general conservation advertising spread throughout the season. This year we hope that we can avoid too much of that type of publicity because we do not believe that it is particularly effective and it certainly confuses our customers. The reason for that confusion in the customers' minds, is, that in our general publicity we ask them to do one thing, and then when an emergency comes we ask them to do something else. The result is that they either get tired listening to us, or feel if they do during an emergency what we ask them in our general publicity, they are doing all that is necessary. We would like to reserve the effectiveness of our publicity for the time when it is most needed.

We have studied our distribution system to determine what sections could be cut off in extreme emergency and have some valves properly located for this purpose. There are no sections we could very well shut off without shutting down some war plant.

24,000 meters—Pressures would be reduced on the low pressure system, which comprises about 95% of our distribution facilities.

295,000 meters—We do not believe that reduction of pressure either on the whole system or in districts will accomplish the desired results.

Our territory has been laid out in districts, plans prepared showing the location of shut-off gates. Isolation gates have been thoroughly inspected and personnel has been instructed so that sections may be isolated in emergency.

* * * * *

As a general summary, the lowering of pressures as a major factor in curtailment would be considered by many as a last resort, either to whole system or to sections.

22,000 meters—Curtailment will be in the following order: First, wholesale gas to other companies; second, to outlying towns; third, to sections of the City itself.

30,900 meters—Lists of all industrial, commercial and house heating consumers on several high pressure trunk lines have been prepared. The lists, one for each trunk line, contain name, address and telephone number of all industrial, commercial and house heating consumers on the respective line, their maximum coincident load and the name of the person with whom curtailment would have to be arranged. Any one or all of these consumers on the list of the trunk line on which conditions have been critical, may be called to drop part or all of their gas load, according to the magnitude of the emergency. The consumers will be called in the order of the classes, defined in Order PD-736, to which they belong.

Radio and newspaper appeals will be made asking domestic consumers to reduce their consumption.

8,916 meters—We do not contemplate curtailment of service under Order L-174. During the past three years our industrial sales have doubled but the increase in percentage of the total gas sales used for industrial purposes has been from 5 to 8.2%.

We have 116 customers in commercial establishments using in excess of 10,000 cubic feet per month. 72 of these customers are war producers or furnish essential civilian service. The five largest industrial concerns are without standby equipment to replace gas fuel, and curtailment will immediately affect war production.

32,000 meters—FOR SEVERAL YEARS, this company has had preference lists which are adaptable to the conditions set forth under Order L-174.

15,500 meters—In a company, which purchases gas, emergency plans to cover conditions resulting from heavy load and restrictions on gas manufacture have been devised to cover the local conditions affecting this individual company.

The plans include the training and mobilization of personnel, methods for notifying customers of emergency, and backed with a comprehensive Advertising Campaign, consisting of newspaper advertisements, direct mail, and bill inserts.

66,000 meters—This company delivers gas to other companies, has high pressure districts and low pressure.

They have a written outline of a prepared program for relief to meet excessive peak hourly demand or peak days. The program is worked in reverse to restore the system back to normal.

To carry out the program, employees are selected and instructed to operate and some are selected to authorize.

Agreement is made, through responsible contact, with large consumers of various types whereby each consumer will curtail their use of gas when notified according to an agreed plan.

These consumers receive personal contact or telephone message and to successfully carry out the program, some industries given advance notice of 48 hours, 24 hours, 12 hours, 8 hours, and some 2 to 4 hours.

Prepared radio messages are also used to warn of gas emergency.

(Concluded on page 76)

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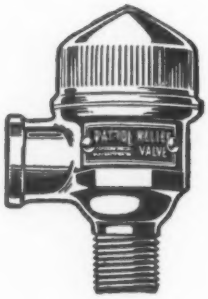

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We need not tell you in mournful words about the hazards of a hot water supply system—you know these facts. However, there is satisfaction in knowing that your Hot Water Supply Systems are protected, at low cost, by

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2310 E. Superior Avenue Cleveland, 14, Ohio

So. Calif. Meter Association Conducting Educational Campaign

By

Fred A. Herr

J. T. Cortelyou, office engineer of the Southern California Gas Co., who as new president of the Southern California Meter Association, is directing that organization's series of co-ordinated lectures to offer metermen an educational course in the principles of gas measurement.

KEYING its current activities to the exigencies of the times in an effort to relieve the manpower shortage in the field of gas measurement and metering in general, the Southern California Meter Association, under the direction of its new president, J. T. Cortelyou, office engineer of the Southern California Gas Co., is conducting an educational program in the form of a co-ordinated series of technical lectures designed to familiarize new men with the principles of gas measurement and offer older metermen a review of techniques.

The educational program consists of a series of ten monthly meetings at each of which established authorities on some specified subject of gas metering are assigned to deliver lectures outlining the principles of the evening's subject in a manner understandable to both novices and experienced metermen.

The educational program is presented on the third Thursday of each month following a dinner at the Rio Hondo Country Club near Downey, some 12 miles southeast of Los Angeles. The series began with the June meeting, at which George T. Foster of the Texas Co. discussed "Calculations of Coefficients for Gas." Also outlined at that meeting were gas laws with their application to orifice meters and installation of orifice meters.

At the July meeting, W. L. Cowen of the Union Oil Co., Los Angeles, past-president of the association, discussed calculation of orifice meter coefficients with particular emphasis on gravity, temperature and deviation factors and also touched upon the application of coefficients to water, steam and oil.

Three-Fold Lecture on Charting

The educational program for the third meeting of the series was presented on the night of September 16 in the form of a three-way discussion of charting. W. S. Kennedy, office supervisor in the utilization engineer's office of the Southern California Gas Co., lectured on chart reading by integrate method; J. T. Cortelyou, association president, on chart reading by the planimeter method; and Harry A. Faull on the sight method of chart reading.

Programs which have been prepared for presentation at the next seven monthly meetings to complete the series of ten will treat the following subjects: maintenance of orifice meters — plates, tubes, etc.; maintenance of orifice meters—Westcott, Foxboro and Emco gauges; maintenance of orifice meters—Bellows and parobolic bell-type of gauges and miscellaneous; regulators, their selection, installation and maintenance; controllers, flow, pressure and temperature, and telemetering; calorimetry and gravitometry, including selection of samples and methods and technique of testing; positive displacement of meters, including discussion of selection, maintenance and proving.

"The Southern California Meter Association's desire to do something to help the manpower situation was the reason for institution of the series of ten monthly educational sessions," President Cortelyou declared. "We found," he explained, "that many new employees were entering the gas utility and the oil business as metermen, a substantial portion of whom, because of the great divergence of experienced men which had taken place to the military and war plants, could use some instruction in meter work. The association decided it could be of service to the war effort by offering a co-ordinated series of educational programs at which new men could be indoctrinated in the principles of gas measurement and older men could be benefited by a review of the subjects."

According to Cortelyou, the lectures are well attended by new men as well as old. Average attendance at classes thus far given has been about 100, or 50% of the total membership of the association. The series, Cortelyou emphasized, is wholly an activity of the Southern California Meter Association and has no connection with any oil or gas company or oil or gas association.

200 Members from 40 Firms

The Southern California Meter Association currently has some 200 members representing 40 Southern California companies, of which 30 are oil firms and gas utilities and 10 supply houses.

The 1943 officers are: President, J. T. Cortelyou, Southern California Gas Co.; vice-president, R. T. Furlong, Texas Co.; treasurer, Lee Cheeves, Southern California Gas Co.; secretary, G. S. Duncan, General Petroleum Corp.

Activities of the association are divided among six standing committees, chairmen of which are: Program, Frank J. Renner, American Recording Chart Co.; Entertainment, A. E. Holmlund, Pittsburgh Equitable Meter Co.; By-Laws, C. J. Hutchings, Tidewater Associated Oil Co.; Standards, E. P. Valby, Richfield Oil Co.; Membership, Mark McIlvane, Chanslor Canfield Midway Oil Co.; and Publicity, W. J. Kennedy, Southern California Gas Co.

Executive Promotions of P. G. and E. Officers

Important changes have been made in the executive staff of the P. G. and E. Co., San Francisco, Calif.

P. M. Downing, for fourteen years Vice President and General Manager, has been appointed by the Board of Directors to the position of Executive Vice President.

A. Emory Wishon, for thirteen years Vice President and Assistant General Manager, now is Vice President and General Manager.

Army-Navy "E" Award Goes to Stacey Bros.

Left to right: Wm. E. Gruening, Pres. & Gen. Mgr.; Justus Glass, Shop Production; Capt. John F.. Crowe, U. S. Navy; Albert Wright, Shop Production; Arthur E. Harvey, Vice-Pres. & Sales Mgr.

A Cincinnati company produced the "jack-of-all-trades" that helped make possible Allied victories in North Africa, Sicily, Italy—and virtually every other front where American arms have triumphed.

This multi-purpose invasion standby is the pontoon. The firm which makes it is the Stacey Bros. Gas Construction Co.

Most persons recognize the pontoon as a rectangular float which permits an army to throw bridges across streams.

That's one kind of pontoon. Then there's the kind that Stacey Bros. build—

They can be used for bridges, too —bigger bridges than the other type permits.

They can be converted into barges.

Lash them together with the secret interlocking device developed by the Navy, and they become a landing field in a swamp, or perhaps even on the ocean.

They perform a vital task in ship salvage. Some of them helped to raise the wreckage at Pearl Harbor.

Pontoons are used as gasoline or water containers . . . and they become floating docks where America must get its war supplies ashore.

These are a few uses to which they are put. It is safe to say that pontoons figure in every amphibious invasion which the United Nations undertake.

When the defense program started three years ago, Stacey Bros. was among a score of companies given contracts to build pontoons.

The need was urgent, the difficulties many. But the Cincinnati firm completed its contract on schedule. In peacetime, the company builds gas holders, huge storage tanks.

It was a far cry from tanks of 10,000,000 cubic feet capacity (the company's biggest) to pontoons whose size is secret but of dwarf-like proportions in comparison. But the company was set for the conversion.

William E. Gruening, president and general manager, and Arthur E. Harvey, vice president and sales manager, were informed with their first contract that no procedures in welding technique could be furnished the company; it would have to work out the bugs itself.

Production figures show it was successful. These are secret, but percentages give an idea. The output is 800 per cent greater today than it was when the first contract was completed.

The government recognized work well done and the company received the Army-Navy E award for outstanding production.

The ceremony took place Oct. 1st. It was patterned after a Navy award ceremony aboard ship and was held to 15 minutes so that production was not interrupted too long.

Flumerfelt Becomes President of Iroquois Gas Corpn.

Olin F. Flumerfelt has been elected president of the Iroquois Gas Corporation of Buffalo, N. Y., to succeed Leigh A. Brown, who has been elected president of the parent company, the National Fuel Gas Company. Mr. Flumerfelt has been vice president.

Stuart H. Nichols, an assistant superintendent in the operating division, was elected vice president to succeed Mr. Flumerfelt. Mr. Flumerfelt has been with the company for 20 years, serving in the engineering and operating divisions, as well as sales.

E. J. Horton Appointed On Robertshaw Staff

The appointment of Mr. E. J. Horton as Assistant to the President, has been announced by Mr. John A. Robertshaw, President of the Robertshaw Thermostat Company, Youngwood, Pa.

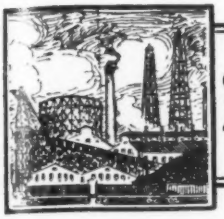
Mr. Horton was graduated from Yale University, Sheffield Scientific School, in mechanical engineering, with the Class of 1906. From 1906 to 1908 he was with the Bullard Machine Tool Company of Bridgeport, Conn. From 1908 to 1910 he was with the Dairy Machinery & Construction Company of Shelton, Conn.

From 1910 to 1943, he was with the Ruud Manufacturing Company of Pittsburgh, Pa., and before coming with Robertshaw, was Chief Engineer of that company. He is a member of the A. G. A. Sub-Committee on Approval Requirements for Water Heaters since the formation of that committee.

Indoor Climate Institute Organized

At a meeting held in Cleveland September 14th, the Indoor Climate Institute was formally organized by leading manufacturers in the heating, cooling and equipment industries. The Institute has, as its primary purpose, a program for the improvement of heating and air conditioning in the interests of public health and greater indoor comfort. The Advisory Council to The Board, Board of Directors and Officers are prominent executives, representing every segment of the related industries.

The I. C. I. membership insignia will stand as a symbol of greater indoor comfort to the American public. The Institute, a non-profit corporation, will have its headquarters in Detroit. It will serve as a clearing house of information, set up with a central staff and committees qualified to conduct a broad program of public and trade education. The public will be informed as to the many benefits in health, comfort and economy resulting from properly designed and installed prime heating equipment—burning coal, gas or oil for warm air, hot water or steam heat.



News of the Gas Industry

War and Post-War Topics to be on Program of A. G. A. Annual Meeting

With world events moving at a rapid pace, the Twenty-fifth Annual Meeting of the American Gas Association which takes place October 26, 27 and 28 at the Jefferson Hotel, St. Louis, Missouri, is bound to be a momentous one.

Foremost among the vital war topics to be discussed are those pertaining to effective gas utilization in war industries, production, fuel, materials and manpower conservation and the whole array of problems connected with food production and preparation. Post-war subjects revolve around gas industry research, appliance developments, advertising, marketing, and technological improvements.

The framework of the program set up consists of a General Luncheon, Wednesday, Oct. 27; General Sessions, Wednesday afternoon, Thursday morning and afternoon, and a General Luncheon, Thursday. The Home Service Breakfast will be held Wednesday. Sectional meetings will take place all day Tuesday and Wednesday morning.

The General Sessions' program will open with a luncheon meeting which will feature an address on the economics of the post-war period by a nationally known economist. Immediately thereafter, the first General Session will be held. Arthur F. Bridge, president of the Association, will make his annual address at this session, reviewing the outstanding events of his administration.

Turning the spotlight directly on the war effort, Ernest R. Acker, vice-president of the Association and chairman of the Committee on War Activities, will speak on "The War and the Gas Industry."

Another highlight of the first General Session will be an address by a governmental authority on "Food Production, Conservation and Preservation." Growing national concern over the food situation, and the gas industry's leadership in this field give this event urgent timeliness.

Other important matters to come before the Wednesday meeting are the election of officers and a report on the Association's finances.

The General Sessions Thursday, both morning and afternoon, will be devoted almost entirely to problems keyed to the future of the gas industry. Recognizing the importance of developing the industry's product and its utilization to the fullest extent, a prominent place has been reserved on the program for a discussion of research and all its ramifications.

Colonel Hudson W. Reed, president, The Philadelphia Gas Works Company, will speak on "Forward Thinking on Post-War Industry Needs." Col. Reed is expected to focus attention on post-war plans in the appliance field.

MEETING OF EXECUTIVE BOARD, AMERICAN GAS ASSOCIATION, NEW YORK, SEPTEMBER 14, 1943

Seated, left to right: Col. Hudson W. Reed, C. M. Cohn, James A. Brown, Alexander Forward, President A. F. Bridge, Vice President E. R. Acker, W. C. Beckjord, Treasurer J. L. Llewellyn, D. W. Harris, Major T. J. Strickler.

Standing: Randall J. LeBoeuf, E. J. Boothby, John W. Batten, B. H. Gardner, E. P. Noppel, C. A. Tattersall, C. F. Turner, L. A. Mayo, W. E. Derwent, Kurwin R. Boyes, C. V. Sorenson, G. S. Hawley, E. J. Tucker, H. L. Gaidry, Burt R. Bay, H. N. Mallon.

Round Table Discussion on Industrial Gas

The Industrial Gas Round Table at the National Metal Congress will be held in the Crystal Room of the Palmer House, Chicago, Tuesday, October 19, at 9:30 A.M. The Round Table will be sponsored by the Industrial and Commercial Gas Section of the American Gas Association and will be presided over by Mr. Carl H. Lekberg, Public Service Company of Northern Indiana, Hammond, Indiana. There will be a full program reviewing the technical experiences in applying gas to various metal treating operations under war production conditions and several authorities will speak on plans for industrial gas utilization during the post-war period.

All gas men, manufacturers of equipment and others interested in modern heat-treating methods and appliances are invited to attend.

University Engineering Head Joins Lincoln as Welding Consulting Engineer

The Lincoln Electric Company, Cleveland, Ohio, announces the appointment of William J. Conley, former chairman of the Engineering Department of the University of Rochester, Rochester, N. Y., as consulting engineer. He will act as a Lincoln welding consultant for various industries, handling problems on mechanical and structural design utilizing welding, as well as metallurgical problems involving welding processes.

In connection with his work, Mr. Conley will have charge of the company's welding educational activities, consisting of courses in welding engineering and design as well as lectures and talks on welding in the plant and in the field before technical societies and industrial groups.

Receiving his degree in Mechanical Engineering from the University of Rochester in 1918, Mr. Conley soon afterwards was serving as a lieutenant in the U. S. Army Engineers. Following the war, he entered upon his industrial career with the Gleason Works in Rochester and after two years returned to the University of Rochester as an instructor in Applied Mechanics.

Mr. Conley's specialization in welding technique and his experience in processing and in new product development will be of great assistance to industry in efficient application of welding to design, manufacture and construction.

A.G.A.E.M. Officers and Chairmen for One Year from October 1st, 1943

The following are the officers of the Association of Gas Appliance & Equipment Manufacturers for the year beginning Oct. 1, 1943, also the chairmen of the various committees and divisions.

President—W. F. Rockwell, Pres., Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

1st Vice President—Lyle C. Harvey, Pres., Bryant Heater Company, Cleveland, Ohio.

Col. W. F. Rockwell
President

2nd Vice President—D. P. O'Keefe, Pres., O'Keefe & Merritt Company, Los Angeles, Calif.

Treasurer—John Van Norden, Sec., American Meter Company, New York, N. Y.

Past President—W. E. Derwent, V. P., George D. Roper Corp., Rockford, Illinois.

Chairman Advisory Council—A. P. Brill, Pres., Ruud Manufacturing Co., Pittsburgh, Pa.

Chairman General Policy Committee—W. T. Rasch, Pres., Security Manufacturing Co., Kansas City, Missouri.

Chairman House Heating & Air Conditioning Equipment Div.—A. A. Marks, Mgr. Gas Prod. Div., Richmond Radiator Co., Uniontown, Pa.

Chairman Gas Meter & Regulator Division—L. A. Dixon, Pres., Pittsburgh Du Bois Co., Div. Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

Chairman Gas Water Heater Division—J. R. Lavelle, Sales Manager, John Wood Mfg. Co., Conshohocken, Pa.

Chairman Domestic Gas Range Division—F. J. Hoenigman, Executive V. P., and Director, Cribben & Sexton Co., Chicago, Ill.

Chairman CP Sales Management Committee—Lloyd C. Ginn, American Stove Company, Cleveland, Ohio.

Chairman Industrial Gas Equipment Division—E. W. Mears, President, Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.

Chairman Gas Valve Division—R. L. O'Brien, President, Detroit Brass & Malleable Works, Detroit, Michigan.

Chairman Hotel, Restaurant & Commercial Gas Equipment Division—W. Frank Roberts, President, Standard Gas Equipment Corp., Baltimore, Md.

Chairman Direct Heating Equipment Division—Leo Ryall, Sales Manager, General Gas Light Company, Kalamazoo, Michigan.

Chairman Thermostatic Control and Accessories Div.—H. T. Ryan, V. P., Robertshaw Thermostat Co., Youngwood, Pa.

Chairman Manufacturers Section P.C.G.A.—A. H. Sutton, Pres., Mission Water Heater Co., Los Angeles, California.

Alternate to Mr. Sutton—F. C. Packer, Assistant to V. P. and General Manager, Payne Furnace Co., Beverly Hills, Cal.

Vice Chairman Manufacturers Section P.C.G.A.—E. T. Howard, General Controls Company, Glendale, Calif.

Alternate to Mr. Howard—C. R. Ohnimus, V. P., Hammer Bray Co., Oakland, California.

Counsel—George H. Richards, Reynolds, Richards & McCutcheon, New York, N. Y.

Secretary—H. Leigh Whitelaw.

The next meeting of the Association will be at the Jefferson Hotel, St. Louis, Mo., starting on Monday, Oct. 25th. At noon on Oct. 25th the Post War Planning Committee Luncheon will be held. Starting at 2.00 P.M. several divisions will hold meetings. The Gas Meter & Regulator Division will hold their meeting Wednesday afternoon at 2.30.

No. Indiana Public Service Buys La Porte Company

The Indiana public service commission has approved the purchase of the La Porte (Ind.) Gas and Electric Co. for $2,500,000 by the Northern Indiana Public Service Co., from the United Light and Power Co.

L. C. Harvey

D. P. O'Keefe

J. Van Norden

H. Leigh Whitelaw

Changes in Personnel of Seattle Gas Company

James F. Pollard, president of Seattle Gas Co., Seattle, Wash., has resigned his position and N. Henry Gellert, president of several utilities, has been selected to succeed him.

Mr. Pollard, winner of the Charles A. Munroe Award in 1939 and in the industry credited with having provided the leadership in initiating the national cooperative gas advertising program, joined Seattle Gas Co. in 1930 as general manager and was elected president in 1936. He is leaving Seattle because physicians have advised that a return to California is necessary for the benefit of Mrs. Pollard's health.

Mr. Gellert, who moves to Seattle November 1 from Philadelphia, Pa., is resigning as president of Great Lakes Utilities Co., Atlantic Gas Corp., Pennsylvania and Southern Gas Co., and all their subsidiaries. He continues as president of American States Utilities Corp. and Southern California Water Co. and chairman of the board of Edison Sault Electric Co.

With the change in presidents in the Seattle company, a number of executive appointments were announced September 1 following the board of directors' meeting. They became effective on that date.

Charles M. Sturkey of Rock Hill, S. C., is the new vice-president and general manager. He has resigned as president of Ohio Gas Light and Coke Co. and as vice-president of Great Lakes Utilities Co., Atlantic Gas Corp., Pennsylvania and Southern Gas Co., and as officer and director of all their subsidiaries.

Norbert O. Fratt is advanced to the position of vice-president in charge of sales and merchandising. Starting with Seattle Gas Co. in 1928 as a salesman, he has been for several years domestic sales manager and more recently assistant general manager.

P. R. Dunbar, for 12 years auditor and chief accountant of the company, is named comptroller.

John F. Shaw, who has been with the company for 10 years in various capacities, moves from engineer of maintenance and construction to the position of chief engineer.

Fred W. Barnum, in the stores and purchasing department of the organization for 28 years, becomes director of purchases.

Leland E. Jones is assistant superintendent of production. He came to Seattle Gas Co. in December, 1942, from Rock Hill, S. C., where he was vice-president and manager of Rock Hill Gas Co.

Another Successful A.G.A. Personnel Conference

With about 25 present the Second Southwest Personnel Conference of the American Gas Association was held on August 25 and 26, 1943, at the Hotel Adolphus in Dallas, Texas. In the absence of the Chairman, M. V. Cousins of Shreveport, Willard G. Wiegel, Personnel Director, Lone Star Gas Company, Dallas, presided. The American Gas Association was again represented by its Secretary, Kurwin R. Boyes.

In its short life, the Conference has completed two definite accomplishments which should prove of material benefit to gas companies of the area. It has completed a set of distribution job descriptions for WMC approval and prepared "yardstick" rates for those jobs for WLB consideration. The job descriptions were compiled by a committee of which O. L. Jones of Tulsa was chairman and the rates by a committee headed by F. F. McMullen of Houston.

A number of other wartime personnel problems were aired and discussed which made the two day conference most enlightening to those in attendance. The Third Southwest Personnel Conference, it was decided, would be held in Dallas, November 3 and 4, 1943.

Central Illinois Electric and Gas Co. Displays 107 Employees in Armed Forces

The Central Illinois Electric and Gas Co., Rockford, Illinois, is indeed proud of its 106 men and one woman in the armed forces of this country, for it took two full pages and two colors to tell its story of "We Are Proud of Our Service Flag."

Donald C. McClure, president, said that the advertisement attracted a large amount of attention and was the subject of much discussion. The Rockford Morning Star and Rockford Register Republic commented on the advertisement in front page space because of the unusual fact that pictures were secured from each one of its 107 former employees, even though none of these pictures were in the files prior to the creation and development of the advertisement. The securing of the pictures was part of a painstaking task, set up by Mr. Charles Shockley, in cooperation with the company's advertising agency, the Chicago office of Bozell & Jacobs, Inc.

Hart Becomes Sales Mgr. at Nashville, Tenn.

Terry Hart, son of the late J. E. Hart, bursar of Vanderbilt University for 30 years, and the late Mrs. Hart, has been appointed general sales manager of the Nashville Gas and Heating Company, it has been announced by S. E. Linton, president of the company.

Hart, a native of Nashville, succeeds W. E. Leverette, who several months ago accepted a position with the Kinrad Corporation of Owensboro, Ky. Assistant to Leverette for several years, Hart has been acting general sales manager since Leverette's leaving.

The new manager will be in charge of domestic, commercial, industrial, and heating services of the company, as well as the advertising department.

Consolidation Would Simplify System's Many Reports

The 1,768 reports which the Niagara Hudson System's constituent companies are required to make each year to Federal and State agencies will be reduced by over 1,000 by consolidating these companies into a single operating unit, George J. Brett, controller of the Niagara Hudson Power Corporation stated recently, in continuing his testimony at the hearing before the Public Service Commission. The hearing was on the consolidation plan, in connection with the proposed reorganization of the Niagara Hudson System.

Mr. Brett said that the creation of new Government agencies since 1930 and the demand for additional reports from those that were in existence at that time, had greatly increased accounting costs. The proposed consolidation, he added, by reducing the number of reports required, will effect an important saving in those costs.

THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

Ask for circulars on this and other distribution equipment.

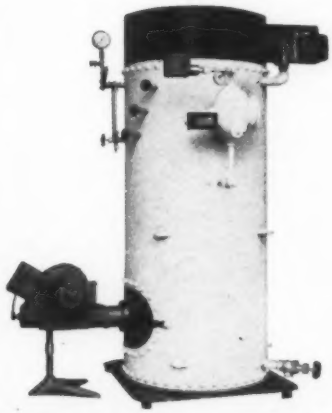
Nearly a half century of service to the Gas Industry.

GOODMAN — USED SINCE 1897 — Z" HANDLE & LOCKING SLEEVE — GAS MAIN STOPPER

The Reliable Shut-Off for Street Mains

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

LATTNER GAS — OIL BOILER 3 HP to 35 HP.



Burns natural gas or regular furnace oils with equal efficiency using same burner.

P. M. Lattner Mfg. Company
Cedar Rapids, Iowa

Southern California Gas Co. Adds to Its Transmission System

Southern California Gas Co. has been given the "go ahead" signal by the War Production Board on two construction projects involving an expenditure of more than $300,000 and designed to increase the facilities of its natural gas transmission system for the 1943-44 winter season.

Project No. 1, costing approximately $295,000, involves the reinstallation of 9½ miles of 20-inch transmission line in the Kettleman Hills area of central California. This line was removed by governmental order two years ago to serve as an extension of the Stanpac transmission line, extending from the Kettleman Hills northward to the San Francisco area, when that line was changed over from a natural gas transmission line to a crude oil line.

Reconstruction of the link in question will bring capacity of the line to its original total and will eliminate the hazard which has existed for two years of having available only one large-sized pipeline for bringing gas from the Kettleman Hills natural gas producing area to the Los Angeles metropolitan section.

According to H. P. George, production and transmission manager for the Southern California Gas Co., reinstallation of the line is expected to be completed before the peak period of winter demand begins.

A smaller project which has also received approval of the W.P.B. involves extension of the revetment on the Santa Clara River near Castaic, Calif., as a protection for several major pipelines which cross the river at that point. The system of lines carries 50% of all the natural gas delivered to the Southern California area, including all the natural gas delivered from San Joaquin Valley fields to Los Angeles. The project calls for construction of 750 additional feet to the existing 1000-foot-long revetment and installation of three stubs with a total length of 191 feet, all of which is intended to reduce damage to the lines by washouts.

New 1200 Mile Pipe Line

Decision to construct a 1,200-mile natural-gas pipe line from the Southwest to the Appalachian manufacturing area for the winter of 1944-'45 has been announced by the War Production Board.

The Federal Power Commission has been advised by the board that necessary authorizations and priorities will be issued as soon as the commission decides which of the applicants will build the line, J. A. Krug, the board's program vice-chairman, specified, however, that to meet fabrication schedules in time for operation of the pipe line next year, the steel order must be placed not later than Oct. 1.

The Federal Power Commission, at the conclusion of a hearing September 20 decided unanimously to authorize the issuance of an appropriate certificate of public convenience and necessity to the Tennessee Gas and Transmission Company, Chattanooga, Tennessee, for the construction, operation and maintenance of the pipe line from Driscoll, Texas, near Corpus Christi, to the Cornwell compressor station of the Hope Natural Gas Company near Charleston, West Virginia, to augment failing natural gas supplies in the Appalachian area.

Wessells Appointed as Research Engineer

President Franck R. Havenner announced Sept. 2nd the appointment of Walter B. Wessells as Research Engineer in the California Railroad Commission's Public Utilities Department.

Mr. Wessells succeeds Loren W. East, who resigned to engage in private practice as a consulting engineer in Los Angeles.

Mr. Wessells is a graduate in engineering at Johns Hopkins University. He has been employed by the Commission for the past sixteen years and has participated in numerous telephone rate proceedings. He took part in the development of nationwide procedures in telephone rate regulation at Washington, D. C., New York and Chicago.

In his new position, Wessells will be responsible for general investigations of utility operations and earnings, and special investigations as directed by the Commission.

Gas Gets Its Wings at LaGuardia Field

Gas will soon perform an interesting and important role in repairing the Pan-American Clipper ships which carry men and materials to the far corners of the earth. At the new shops of Pan-American Airways, New York's municipal airport, there has recently been installed a large gas-fired salt bath furnace for heat treating the aluminum alloy sheets and structures.

The aluminum alloy parts, as they come from the fabricating shops are soft, pliable, and lacking in strength. This is most desirable since in that state the metal is more easily shaped. In order to produce in them the desired hardness, toughness and strength, the aluminum alloy parts are given what is called the "solution heat treatment." They are immersed in a bath of molten nitrate salts automatically held at a temperature of 920 degrees Fahrenheit. After being heated thoroughly, the parts are withdrawn from the salt bath and immediately quenched in a tank of cold water. At this time the metal is still soft and pliable, but at ordinary room temperature, crystalline changes start to take place and the metal soon takes on the required physical properties of hardness.

The furnace at Pan-American is the largest gas-fired furnace of its kind in the metropolitan area. In addition, it is unique in the manner of heat application.

The tank in which the molten salt is contained is made of steel plate 1¼ inches thick. It is 14 feet long, five feet deep and 30 inches wide. It weighs about five tons empty, and holds ten tons of nitrate salts. All heat is applied on the sides of the tank using 44 Selas Duradiant burners. Heating is done mostly by radiation, and the burners somewhat resemble sun lamps. When operating at full capacity these burners consume gas sufficient to operate approximately one thousand gas refrigerators.

When Pan-American first decided to purchase a furnace of this type, they examined bids from several furnace companies, including at least one electric furnace manufacturer. After careful consideration they adopted the proposal submitted by the Engineering Division of the New Business Department. Designs were prepared by and erection was completed under the supervision of Fred K. Whiteside, Engineer of Industrial Gas Utilization.—*The Brooklyn Union Gas News.*

CLEVELAND
"A" TYPE METERS
"B" TYPE METERS
DIAPHRAGMS
Cleveland Gas Meter Co.
2180 East 65th St., Cleveland, Ohio ESTABLISHED 1895

BARBER BURNERS
For All Gas Appliances

S-80

Z-21
Under wartime stresses of fuel shortages and material scarcities, the economical, continuous, trouble-free performance of gas appliances, now in operation, equipped with Barber Burners, is an outstanding contribution to the war effort. Our factory is now concentrated on combat equipment. For permitted purposes, our regular line is still supplied. Later, Barber Burners and Regulators will again be available to all.
Latest Catalog on request.
THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, O.

At a lively gathering of the Portland (Ore.) Gas & Coke Company Veterans' Club 43 new members were initiated to bring the total membership to 429 or 63 per cent of the Company's people. Oldest member in point of service is Ah Lee, Chinese gardener, with 56 years. Among ten-year "baby" members initiated was Paul B. McKee, Company president.

Portland (Ore.) Gas Veterans Initiate New Members

Membership in Portland (Ore.) Gas & Coke Company's Veterans' Club climbed to 429 in September with initiation of 43 new members at a lively get-together in the Masonic temple.

A 42-year veteran from the utilization bureau, J. C. Ryan, and a 37-year veteran of the production bureau, C. H. Sundby, took over the initiation of Paul B. McKee, Company president, who had become eligible this year with a decade of service.

Master of ceremonies was George Mackenzie, assistant treasurer of the Company and a 25-year veteran. He sketched the growth of the Company from the days when covered wagons were still deepening the ruts of the Oregon trail 84 years ago.

Sixty-three per cent of the Company's people have ten years or more of service. Ah Lee, native of China, is the oldest in point of service, being credited with 46 years. He and his countrymen were accorded a special tribute for their valiant stand with the United Nations.

The 35-year class of veterans has 21 members and the 30-year class has 40. Quarter-century veterans number 47. The 20-year class is the largest with 145, followed by the 15-year class with 131.

Jersey Central Power & Light Co. Appoints H. P. Richmond Supt.

Harold P. Richmond, formerly manager of the Dover district of the Jersey Central Power and Light Co., has been appointed general superintendent of operations for the company with headquarters at Asbury Park, N. J., according to the announcement of Thomas R. Crumley, president. In this capacity Mr. Richmond will have charge of all electric and gas operations.

Mr. Richmond began his work with the company in 1929 as a cadet engineer, following his graduation from college. When the gas and electric properties in the shore area were combined through the consolidation of the Eastern New Jersey Power Co., and Jersey Central in 1931, Richmond went into the gas end of the business, serving as assistant to the gas engineer.

In 1936 he was made assistant to the general superintendent of the gas department, but the following year transferred to the accounting end of the business, serving as a traveling auditor. Later the same year he was made district manager of Dover where, in addition to the commercial office and sales activity, the company maintains a large gas plant which also came under Richmond's supervision as manager.

Extension of Natural Gas Services in Saskatchewan

Community Services Limited, a producer-consumer-owner company which seeks to supply the area between North Battleford and Lloydminster, Sask., has now opened offices at North Battleford and is signing up householders in this area. It is stated that a 50 per cent signature of householders in North Battleford who desire natural gas service is necessary before the government will approve the project. One million and a half has been subscribed for pipe installment and distribution cost by bondholders.

Once the necessary number of signatures has been secured a franchise will be applied for and the officials of the company state that a $10 fee in the Community Services organization will be the only payment necessary to tie in with the cost distribution system.

The project involves the laying of 110 miles of six-inch pipe and it is stated that a priority permit has been secured for this operation. Application has been made for pipeline rights of way to follow the C. N. R. Railway line from Lloydminster to North Battleford. Shipment of steel for the pipeline has been granted by manufacturers.

Robertshaw Starts Educational Program to Aid Food and Fuel Conservation

John A. Robertshaw, President of Robertshaw Thermostat Co., Youngwood, Pa., announces that the company has inaugurated a unique educational program having the two-pronged objective of aiding the war effort currently while building future goodwill for Robertshaw and for the range manufacturers it serves.

The Robertshaw Company is addressing homemakers direct through the medium of women's interest programs on leading radio stations in metropolitan markets from coast to coast. Eminent conductors of outstanding women's programs are telling homemakers of the importance of using correct oven temperatures to avoid waste of food and fuel.

Outstanding radio personalities in the field of women's service are pointing out how the proper control of oven heat can prevent excessive shrinking of precious meat and how proper setting of oven heat controls can prevent over-cooking or under-cooking with its resultant food waste.

Also featured over the air are suggestions as to how a complete meal can be cooked in the oven at the same time and at the same controlled temperature.

"We believe that our efforts will benefit homemakers everywhere," said Mr. Robertshaw, "whether they now have heat controls or not, for the information on how to use their ovens properly will be helpful to the war effort by cooperating with Government nutrition and food conservation campaigns. Our educational program should cause homemakers to be more aware of the value of oven heat controls than ever before and should go a long way to keep Robertshaw Oven Heat Controls a first and most important accessory that will be looked for by prospective buyers of new ranges when they again become available."

Yellott Appointed to I.G.T. Directorship

John I. Yellott, recipient of Chicago and Illinois Junior Chamber of Commerce awards for distinguished service in 1942 for his educational training activities, has been appointed full-time director of the Institute of Gas Technology at Illinois Institute of Technology, it was announced recently by Dr. Henry T. Heald, president.

Yellott, who has been chairman of the department of mechanical engineering and director of war training at Illinois Tech, assumed the duties of his new position as of Sept. 1. He succeeds Harold Vagtborg as director of the Gas Institute.

Vagtborg, director of the Armour Research Foundation at Illinois Tech, served as director of the Institute of Gas Technology during its first two years of operation in addition to his duties as director of the Foundation. At the inception of the Gas Institute in 1941, Vagtborg agreed to assume the directorship for a maximum of two years to assist in getting its program under way.

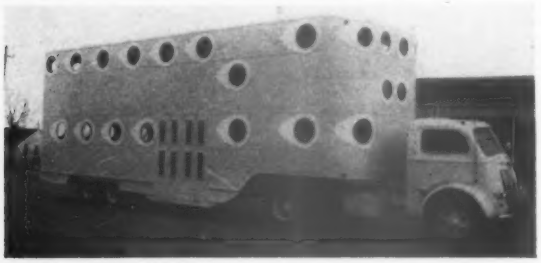
Butane-Fired Gas Furnace Heats Huge Intra-Camp Bus

One of the most unusual gas furnace installations of the year is that of the Public Service Company of Colorado in an intra-camp bus at the army's Camp Carson in Colorado Springs, Colorado.

This camp is so large that special bus service within the grounds is necessary to save time for the personnel. Since distances are relatively short in terms of motor transport, the need has been for one very large bus rather than a number of small ones.

The equipment finally developed for the job is a huge two-deck bus having a capacity of 250 passengers. The size of the carrier was such that no ordinary heating device would maintain adequate temperatures during the winter months.

So, the army called on the Public Service Company to do a regular space-heating job with gas. The installation consists of a 40,000 Btu. capacity gas furnace, having orifices suitable for use with butane. The furnace is located on the first deck, and is vented through a pipe running to the top of the coach. Heat radiates to both levels, maintaining comfortable temperatures in the coldest weather.



This gas-heated two-deck bus has a capacity of 250 passengers.

"Studies in Arc Welding—Design, Manufacture and Construction," first edition, published by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, includes over 1000 illustrations, bound in semi-flexible simulated leather, 6 x 9 inches, with 1295 pages, fully indexed, gold embossed.

98 outstanding papers on arc welding, submitted by trained technicians and engineers in The James F. Lincoln Arc Welding Foundation's 1940-42 Industrial Progress Award Program, have been edited and published in what is said to be the most comprehensive and complete collection of design studies on arc welding published since the Foundation's first volume was issued in 1939.

The volume is the result of the careful editing of papers on arc welding practice representing the work of 113 engineers, designers, works managers, superintendents, executives, foremen and other technicians, each of whom applied himself individually to a specific design study involving arc welding.

The contents of the book are arranged in nine sections with 98 chapters. Each chapter covers a specific design subject; each section covers a particular field, such as aircraft, railroad, etc. The sections are as follows:

Section I—Automotive
Section II—Aircraft
Section III—Railroad
Section IV—Watercraft
Section V—Structural
Section VI—Furniture and Fixtures
Section VII—Commercial Welding
Section VIII—Containers
Section IX—Machinery

"Studies in Arc Welding" is priced at $1.50 per copy, postpaid anywhere in the United States, $2.00 elsewhere. Copies may be secured by writing The James F. Lincoln Arc Welding Foundation, P. O. Box 5728, Cleveland, Ohio.

Servel Inc. Announces New Appointments

Five major changes in the administrative organization of Servel, Inc., were announced Sept. 1 by Louis Ruthenburg, president.

The changes, which become effective immediately, are as follows:

Harry Newcomb, formerly vice-president in charge of the company's electric refrigeration and gas water heater divisions, becomes vice-president and assistant to the president.

North I. Townsend, formerly secretary and treasurer, becomes vice-president in charge of finance.

Rudolph Schnakenburg, formerly comptroller, becomes secretary and treasurer.

W. F. Hassee, formerly chief accountant, becomes comptroller.

Henry O. Roberts, personnel director, assumes responsibility for the personnel administration of all the divisions of the company, reporting to the president.

Servel's other vice-presidents will continue to act in the same capacities as they have in the past. They are:

George S. Jones, Jr., vice-president in charge of sales; W. R. Hainsworth, vice-president in charge of engineering; W. E. Baker, vice-president in charge of manufacturing; and Harry A. Strong.

This announcement comes as a part of Servel's program in preparing its organization for rapid post-war development of many diversified products for the American home. In addition to the Servel gas refrigerator, a complete new line of gas water heaters and commercial electric refrigeration products, Servel also has other new appliances scheduled for early post-war production.

As announced recently, one of these new products is all-year gas air conditioning designed for homes and small commercial establishments. This single new development alone will call for a substantial increase over pre-war employment levels.

Time-Saving Compressor Calculator

An ingenious compressor calculator, designed to save critical time in computing compressor requirements or in estimating the performance of present compressor units, has been prepared by The Cooper-Bessemer Corporation, Mt. Vernon, O.

The calculator, which is made of heavy stock, is pocket size, measuring 3½ inches by 8½ inches.

The device has proved so useful that it is now offered gratis to all responsible engineering and operating executives as long as the limited supply lasts. Requests should be directed to The Cooper-Bessemer Corporation, Mount Vernon, Ohio.

THE STACEY MANUFACTURING CO.
Engineers Fabricators Constructors
• Gas Holders • Gas Plant Equipment • Steel Plate Construction •
GAS HOLDER INSPECTION SERVICE
Cincinnati — Ohio
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STACEY SINCE 1851
Years

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POSITION WANTED

ABILITY YOU MAY BE ABLE TO USE TO ADVANTAGE: A man with 24 years of experience in the operation of manufactured gas properties. Who has worked for but two employers, but in a field broad enough to give experience in all phases of manufacture, distribution and utilization. He has been Superintendent of individual plants and has supervised operations of a group of small plants. Knows how to secure and maintain high plant efficiencies and has a better-than-average knowledge of gas technology. He has administrative ability and can build personnel and develop a capable organization. Now permanently employed, but position does not use his abilities adequately. Available for interview or will mail additional facts. Address Box 130, American Gas Journal, 53 Park Place, New York, N. Y.

This issue of American Gas Journal will reach you one week later than usual. When the change in A.G.A. Convention date was announced, our plans for October issue had progressed so far, we had to proceed with them, but decided to mail the issue one week later than publication date. As the November issue will include a complete report of the A.G.A. meeting, it will be a few days late. December issue will get back to schedule.

Hollingsworth Appointed to Post of Sales and Advertising Manager

John M. Hollingsworth has been appointed manager of the newly organized sales promotion department of the Iowa-Illinois Gas and Electric Company whose headquarters are in Rock Island, Illinois. Announcement was made recently by John V. McKinney, president of the company.

A member of the United Light and Power Service Company organization in the capacity of advertising manager since 1929, Hollingsworth will have charge of all sales promotion and advertising activities of the Iowa-Illinois Gas and Electric Company group.

CRUSE-KEMPER COMPANY

AMBLER, PA.

GAS HOLDERS • PURIFIERS • INSPECTION

40 YEARS OF SOUND

STEEL PLATE CONSTRUCTION

Water Gas Machines

(Continued from page 46)

From 1400 to 1700 cubic feet of generator air will ordinarily be needed for each MCF of finished gas made. Light porous coke will require more generator air than will heavy dense coke or anthracite, and high Btu gas will require less than will gas of a lower Btu value because there will be a larger percentage of oil gas. For a 525 Btu gas with a good fuel, 1500 cubic feet is a good average.

Of course a larger machine will make more gas per run than will a smaller one. In general, we can expect a capacity of about 250 to 275 cubic feet of gas per square foot of grate area per run. Table II below, gives expected make per run and cubic feet of generator air per run, for the three sized machines of Table I.

be managed on hand operated machines without making too much work for the operator and having too much of the cycle taken up by valve changing. Where the machine is automatically controlled it may be advisable to reduce this to one and one-half (1½) minutes, but only if valves operate quickly. Blows of more than two minutes may be necessary if blower capacity is low but are not generally advisable or necessary.

Carburetor Air

Carburetor air is seldom measured, but for a 525 Btu gas the carbon monoxide (CO) in the generator gases necessary to heat the carburetor and superheater will require about one-third of the amount of air used by the generator. Higher heat values will require a greater percentage and lower ones less.

Opening the carburetor blast valve has two effects. It drops the pressure in the blast main and increases the back pressure on the generator. Hence generator air rate is reduced when the carburetor air gate is opened. It is not necessary that the generator be blasted at a constant rate, as long as the total air per blow is kept constant, but the generator air gate may be opened wider after carburetor air is on if it is so desired.

At the start of the blow the fire is relatively cool and the carbon monoxide (CO) percentage in the generator gases will be low. As the blow progresses the fire temperature will increase and give an increasing percentage of carbon monoxide (CO). For economy in utilization of the blast gases the carburetor blast valve should not be opened for a few seconds after the generator blast is on and then should be opened gradually, as carbon monoxide (CO) production increases, so that any blue flame at the stack will just be extinguished.

If a pilot light is used at the stack waste gases containing more than two per cent (2%) carbon monoxide (CO) will ignite there and burn with a blue flame and excessive flame action is a sure sign of deficiency of carburetor air and waste of carbon monoxide (CO). If additional carburetor air under these conditions, has a tendency to overheat the checkers it indicates that fuel bed temperature is too high, and it should be adjusted as previously outlined.

It is sometimes the practice to "overblast" the carburetor when there is a tendency for checkers to overheat. Overheating can sometimes be controlled in this manner but the excess air so supplied is heated to the temperature of the brick work through which it passes and carries heat from the set which must be produced by burning additional generator fuel.

(Part 2 will appear in the November issue.)

TABLE I

Size of Set	4'6"	5'0"	6'0"
Grate Area (Square Feet)	**5.60**	**8.00**	**13.70**
Air per Minute @ 150 cu. ft. per sq. ft.	**840 cf**	**1200**	**2030 cf**
" " " @ 175 " " " " " "	980	1400	2400
" " " @ 200 " " " " " "	1120	1600	2740

TABLE II

Size of Set	4'6"	5'0"	6'0"
Cu. Ft. Gas per Run	1400 to 1580	2000 to 2200	3430 to 3770
Cu. Ft. Air per Blow	2010 to 2370	3000 to 3300	5150 to 5660

These figures are of course, only approximations, since the factors of machine design, type and size of fuel, etc., all have an effect in a given situation. They are useful only as a guide as to what to expect.

The air per run requirements given in this table show that if blow is to be held to two minutes, air rates in excess of 175 cubic feet per square foot of grate per minute are necessary.

Excessive pressure loss through the set will prevent high blasting rates. If pressure under grates is more than 40 inches of water column, it would be well to take steps to find out why, particularly if air per minute is also low. A check of pressures throughout the machine will show where the restriction is located. Pressure loss through the fuel bed is doing useful work, but excessive losses at other points are waste.

Blasting time generally should not be longer than two minutes per cycle. This is about as short a blow as can

Winter Operating Problems

(Continued from page 65)

The outlying towns supplied from transmission mains are shut off. In these individual towns they have a complete setup for gas curtailment for large customers, house heating and domestic users. These plans are also in detail with regard to restoring gas to the territory; with provision for lowering pressures on the town while recovering gas stock.

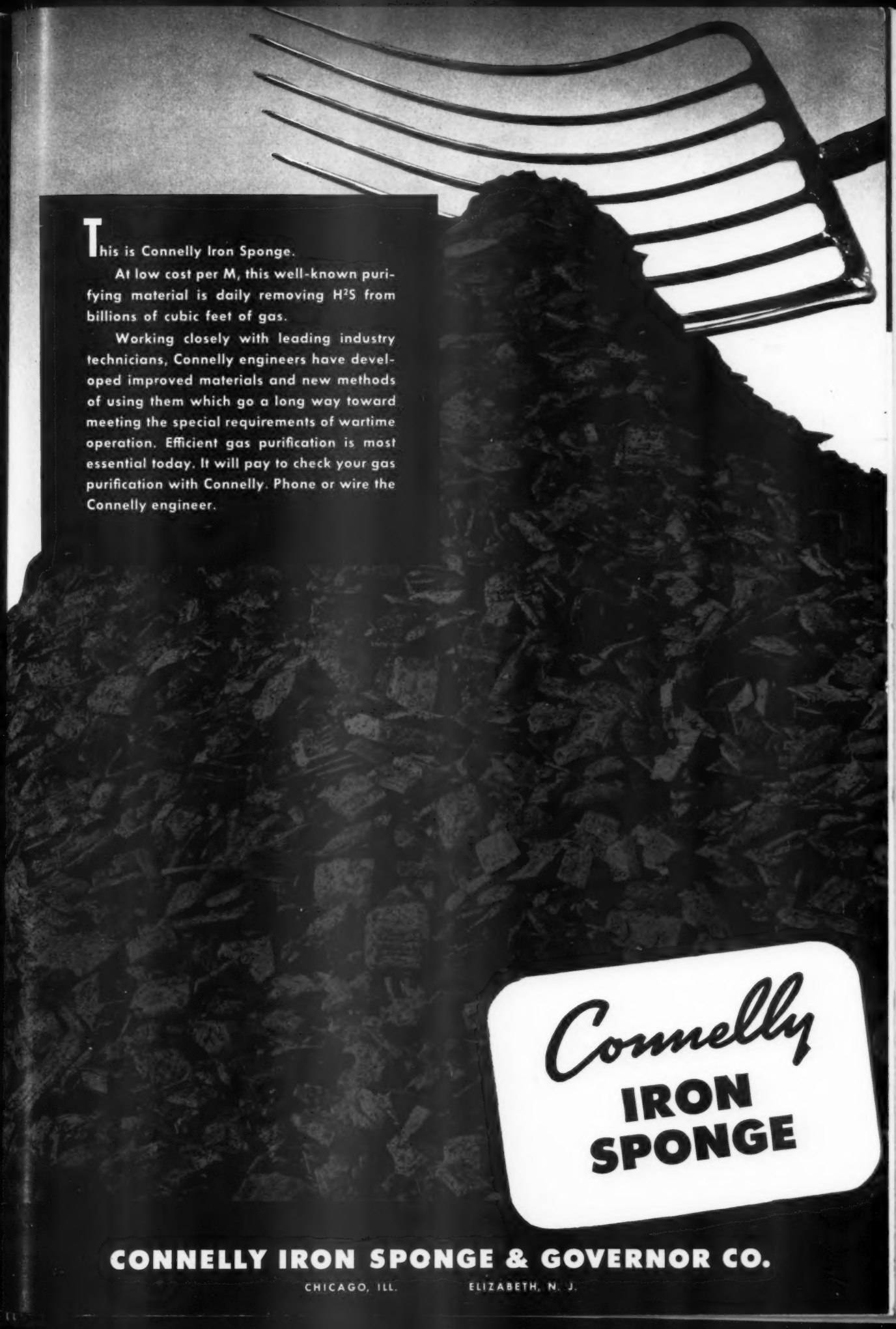
Conclusion A most satisfactory determination by all to see it through this coming winter and beyond.

Paper delivered at the meeting of the Operating Division of the N. E. G. A. September 15th, Worcester, Mass.

Rorison of Servel Inc. Resigns Publicity Post

William A. Rorison, manager of the publications and publicity divisions of Servel, Inc., Evansville, Indiana, has announced his resignation from the company to enter business as a Public Relations Counsel. On November 1st, he will open offices under his own name in the Field Building, 135 S. LaSalle St., Chicago, Illinois.

Mr. Rorison will specialize in corporate public and industrial relations work, a field in which he has had more than 18 years of experience. He has been associated with Servel, Inc., for more than 14 years in public relations, editorial, advertising and sales promotion work. In addition to handling the company's local and national publicity programs, he also served as editor of the *Servel News*, the *Servel Salesman*, and several other publications.


This is Connelly Iron Sponge.
At low cost per M, this well-known purifying material is daily removing H^2S from billions of cubic feet of gas.
Working closely with leading industry technicians, Connelly engineers have developed improved materials and new methods of using them which go a long way toward meeting the special requirements of wartime operation. Efficient gas purification is most essential today. It will pay to check your gas purification with Connelly. Phone or wire the Connelly engineer.
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